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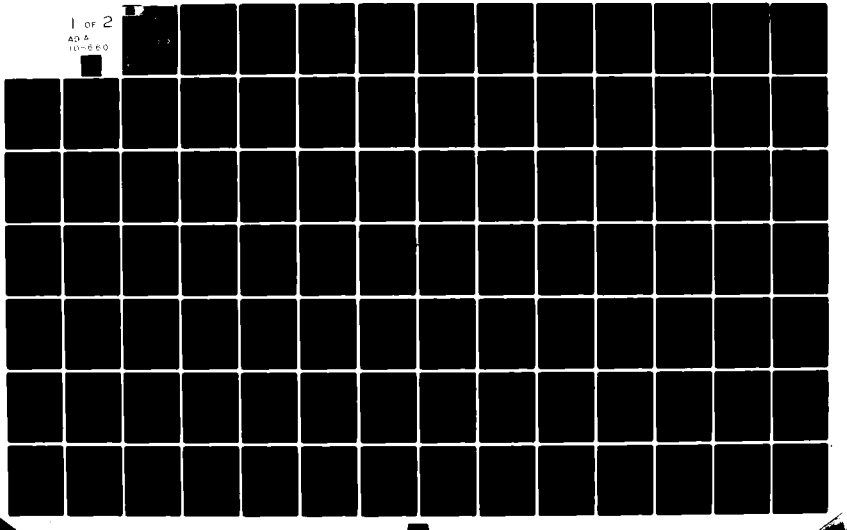

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Commercial Maritime Information:

A Critical Appraisal

Maritime Transportation Research Board
Commission on Sociotechnical Systems

COMMERCIAL MARITIME INFORMATION: A Critical Appraisal

Prepared by the

Maritime Information Committee

of the

Maritime Transportation Research Board
Commission on Sociotechnical Systems
National Research Council

National Academy Press
Washington, D.C.
1981

NOTICE: The project that is the subject of this report was approved by the Governing Board of the National Research Council, whose members are drawn from the councils of the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine. The members of the committee responsible for the report were chosen for their special competences and with regard for appropriate balance.

This report has been reviewed by a group other than the authors according to procedures approved by a Report Review Committee consisting of members of the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine.

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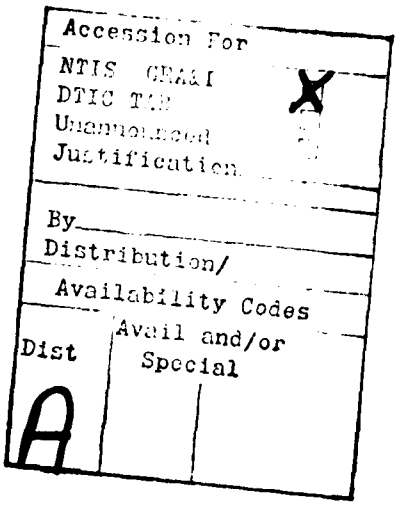

PREFACE

Various government agencies, and a few private organizations, collect and process maritime data to fulfill a mandate prescribed by law or for their own purposes. In the process of carrying out these mandated data acquisition activities, the collectors call upon the maritime industry to fill out differing forms, with differing information demands, covering different time periods and different portions of the data universe. The resulting statistics are published in separate reports and made available on different time schedules. This has created some confusion and incompatibility in the information made available to users of maritime statistical data.

The Maritime Information Committee, a standing committee of the Maritime Transportation Research Board, was assigned the task of investigating the adequacy of maritime data and statistics. For this undertaking the membership of the committee was increased substantially. The expanded committee, including several new liaison representatives from government agencies and industry institutions, held its first meeting in November 1978.

The proposed project initially had the following objectives:

1. To study currently produced maritime statistial data;
2. To analyze the purposes for which statistics are produced, the users of statistics and the cost of the current statistics production system;
3. To meet with users of maritime statistics to determine what needs are and are not being filled;
4. To meet with the agencies generating maritime statistics and the entities reporting to these agencies to determine what improvements in the system can be made; and
5. To recommend a consistent government-wide program of maritime data acquisition, processing, and dissemination that will operate with maximum efficiency to achieve full utilization of the statistical data that are produced.

This report is intended to fulfill these initial objectives.

As the study progressed, the committee membership expanded further and the number of liaison representative increased markedly. Originally, only the Maritime Administration, the Military Traffic

Management Command, and the American Institute of Merchant Shipping were represented; during the course of the project additional help and advice was obtained from the U.S. Coast Guard, the Army Corps of Engineers, the Department of Transportation, the Bureau of the Census, the Shipbuilders Council of America, the Federal Maritime Commission, and the U.S. Customs Service. Several representatives of each of these organizations participated in the six regional meetings held by the committee and also provided both input to, and in-depth review of, this final report on the project. Their contributions were most valuable and are sincerely appreciated.

The Maritime Information Committee members gave unstintingly of their time and effort, not only participating actively in the regional meetings, recording, synthesizing, and analyzing the meeting results, but also participating in the preparation and review of this report. Similarly, the committee is indebted to the 253 representatives of the maritime industry who attended the regional meetings and gave generously of their time and their advice in furthering the work of the committee.

The conduct of this study spanned an unsettled period for the Maritime Transportation Research Board and thus a number of different staff members have served as Project Managers. For their contributions we extend our thanks to Marlene R.B Phillips, Leonard E. Bassil, Harvey C. Paige, and John J. Nachtsheim.

Robert Taggart
Chairman
Maritime Information Committee

June 1981

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CHAPTER 1

INTRODUCTION

As early as 1423, British law required that imported wine be carried in casks of a specified size; these casks were called tuns. Each tun held about 252 gallons of wine and weighed about 2240 pounds. At that time it was the custom of the Crown to fix a price that would be paid for a part of each cargo and it became the duty of the importer to submit to a tonnage tax. Counting each cask delivered by a ship was an arduous task which was soon supplanted by the more logical process of determining the total number of tuns that each ship could carry. This weight carrying capacity of each ship, known as its deadweight, was assigned by various methods until 1720 when, by act of Parliament, a formula was established for measuring capacity that remained in use until 1835; a similar formula, adopted by the United States Congress in 1789, was in effect until 1864.

Interaction between governments and the maritime industry has thus been common practice for centuries; it was based upon the need of governments to impose taxes on imports and exports - cargo movements - between countries. The collection by governments of maritime statistical data, sometimes by the use of assumed relationships, has a parallel history. For example, prior to adopting the Moorsom System of tonnage measurement in 1854, the volume of the entire British merchant fleet was measured. This, divided by the previously assigned total tonnage, yielded 98.22 cubic feet per ton; for convenience this was raised to 100 cubic feet per ton. With this figure it became possible to infer the cargo weight capacity by measuring the volume of the ship. This generalized volume-to-weight relationship, in use throughout the world up to the present, will prevail until the new Intergovernmental Maritime Consultative Organization, International Convention on Tonnage Measurement of Ships comes into effect on 18 July 1982[1].*

The collection and analysis of maritime statistical data for levying duties remains to this day, primarily a government function. However, as will be discussed in this report, there are many additional requirements of both governments and of private commerce and industry that involve data collection, analysis, and dissemination. As these data demands have multiplied, there has been an unavoidable overlap of

*Numbers in brackets designate references at end of report.

intragovernmental requirements while some commercial requirements of the maritime industry remain unsatisfied.

Four notable features of the data have arisen:

(1) use of computers has led to the collection of more data per transaction;

(2) trade volumes (i.e., numbers of transactions) have continued to grow rapidly;

(3) the form and content of one agency's growing data requirements have not been developed to be necessarily compatible with the form and content of data collected by other agencies; and

(4) new data requirements arise for reasons other than tax collection, such as for monitoring regional growth, product consumption, etc.

Inevitably, the rapidly growing mass of maritime data to be digested, much of it still manually processed in a multiplicity of both formats and aggregation levels, has led to a slowdown in the rate that statistical analyses can be performed and the results disseminated. The current situation motivated the Maritime Transportation Research Board (MTRB) to undertake the study reported upon herein. Consequently, the MTRB Planning Committee issued the following statement at the outset of this project:

> "Cargo statistics for movements of oceanborne cargo are collected in an inconsistent form by a number of agencies. The statistics produced are sometimes of dubious value and very difficult to use. The MTRB's Maritime Information Committee could perform a substantial public service by analyzing the types of statistics now produced, the needs of users, and the steps to be taken to create a flow of consistent and useful statistics."

The foregoing paragraph was the summary of the initial charge of the Maritime Transportation Research Board to the Maritime Information Committee when this project was instituted. It soon became evident that, in addition to statistics related to cargo movements only, the study logically must be expanded to encompass vessel characteristics and movements and factors related to ports and waterways. With this enlargement in scope the project was given the title Study of the Adequacy of Maritime Statistical Data; the study resulted in this report.

Problem Analysis and Initial Considerations

An initial examination of the problem revealed the need for defining categories to be included within the scope of the study, to find out how data originate, how data are collected and transmitted, what statistical manipulations are involved, how statistics are compiled, published, and disseminated, and determine who the users of

the output statistics are. As a first step in answering these multiple questions, a sub-study was launched to identify and sort out all of those publications that could be called Maritime Statistical Data.

This sub-study resulted in the publication in December 1978 of a National Academy of Sciences report entitled "Maritime Information Sources: A Guide to Current Statistical Data" [2]. These information sources were described briefly and indexed in the format currently employed by the Maritime Research Information Service. Later, additional sources were incorporated and a second edition entitled "Maritime Information Sources: A Guide to Current Data" was published in August 1979 as a Special Bibliography of the MRIS [3].

These publications include, of course, some sources of maritime statistical data that are beyond the defined scope of the current study since the basic framework for the study has been restricted to maritime transportation in general and the maritime movement of cargo in particular. Although many subjects are obviously beyond the range of consideration, other allied subjects may or may not be germane to the context of this study; thus an early decision was made not to eliminate any area of potential applicability until it was obviously inconsequential to the users of maritime statistical data.

Semantics

Early in the study it became obvious that the semantics of maritime transportation, data, and statistics could pose a problem in reader comprehension of this report. Precise definitions of many of the terms involved are counterproductive since many terms may mean different things depending upon the context in which the term is used. In the following paragraphs, the terms employed herein are discussd, rather than defined, in an attempt to convey how they are employed within the text.

Data are individual pieces of information that may be numeric, alphanumeric, or in word-form giving dimensions, descriptions, or quantities of certain items or characteristics. When multiple data have been manipulated in some fashion, either by sorting into categories or adding together, they become statistical data or, in some cases, simply statistics.

Those people or organizations who furnish the data initially are the originators or suppliers; those to whom the originators transmit the data are collectors and the process is called data acquisition. The data transmission may be simply a towboat pilot handing a form to a lockmaster as the tow goes downriver or transmission may be from a shipping line's computer to the Customs House over telephone lines. In the latter case some processing may already have been performed on the data.

The processor is the manipulator who converts data into statistical data. This may be either hand processing or machine processing depending upon the sophistication of the system involved. Also, it may be partial processing or final processing since, in many instances, there may be several processing and transmission steps involved before

statistical data are converted to their final format or formats. In order to accomplish processing of data which are in consistent form, it may be necessary to alter the form of some data by imputational relationships based on assumed characteristics.

Product generation, dissemination, or promulgation are all terms that describe the activities of the information source or the organization that converts the processed statistical data into a form whereby they can be made available to users and does whatever is necessary to transmit that information to the user. (In some cases, where either computer output transmission or hard copy output is involved, the processor may serve as the information source.) The form may be a regularly published periodical, an in-house document, computer tapes, or an on-line information retrieval service. In any event the basic data have been converted into some form of data product that can be employed by a user. Thus, the total data handling procedure considered in this study runs the gamut from originator to user.

The users of maritime statistical data can be separated into two broad categories. A primary user is one who has a legal mandate or other major need to obtain and to utilize maritime statistical data in order to fulfill some prescribed function; in general, a primary user will have the resources, facilities, and capabilities required to acquire, process, and disseminate the data in the form, quantity, frequency, and with the necessary accuracy to meet the strictures of his mandate. A secondary user is one who has a need for certain types and quantities of statistical data but who does not have the facilities nor capabilities to acquire the data from the originator; it is generally satisfactory (and perhaps economically necessary) for a secondary user to employ the data prepared for one or more primary users and to convert them into the form which best satisfies his needs.

Figure 1 diagrams the flow of data from the originator to the user.

Conduct of the Study

As discussed earlier, the publication of the MRIS Special Bibliography was a significant first step in compiling information sources. Additionally, the preparation of that document inevitably revealed many of the problems that were faced by government agencies and private industry alike in collecting, processing, and disseminating maritime statistical data. Government agencies, in particular, responded to this quest for data sources not only with a substantial amount of material for the edification of the Maritime Information Committee but also assigned liaison representatives to furnish advice and guidance throughout the remainder of the study.

It was primarily in the area of private industry that difficulty was anticipated in achieving a consensus of the problems associated with the collection and use of maritime statistical data. There appeared to be little mutuality in the types of statistical data that were of primary interest and also there was evident a regional bias in what information was considered to be the most important.

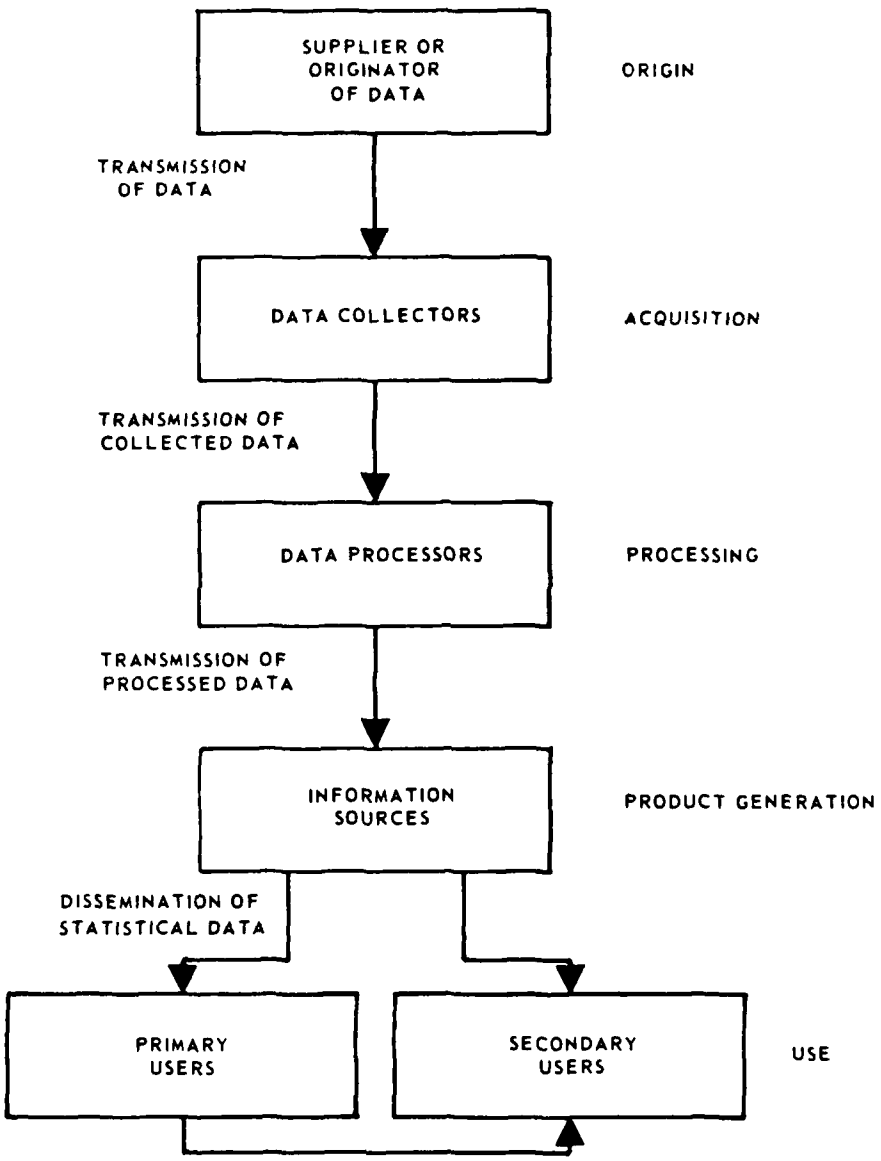

FIGURE 1 MARITIME STATISTICAL DATA FLOW DIAGRAM

As a result, the committee decided to hold a series of regional meetings of selected people and organizations representing all of those elements of the maritime industry that might have an interest in maritime statistical data. The meetings were designed to elicit from those invited their views on the adequacy of maritime statistical data. Those persons invited fell generally into the categories listed in Table 1. The intent was to invite a large variety of interested parties and then to analyze the attendance and the comments of the attendees as a means of determining what groups had a specific interest in certain categories of maritime statistical data. The following schedule of regional meetings was established:

- Washington, D.C. - September 18, 1979
- New Orleans, LA - November 27, 1979
- San Francisco, CA - January 29, 1980
- St. Louis, MO - March 4, 1980
- Chicago, IL - April 29, 1980
- New York, NY - June 17, 1980

Table 1 is so arranged that the regional interests are indicated both in the invitations that were extended and in the resulting attendance in each participant category. Similarly the last two columns, which show the percent of attendees relative to the invitations extended and the percent of attendees by participant category, provide strong evidence of the relative interest in the improvement of maritime statistical data in each participant category.

Format of Regional Meetings

Each invitee was informed in advance of the meeting of the project objectives, i.e.:

(1) To study currently produced maritime statistics;
(2) To analyze the purposes for which these statistics are collected and the primary uses of the information;
(3) To meet with collectors, processors, and users of data to determine what needs are or are not being filled;
(4) To meet with agencies that generate and report on the data to determine what improvements can be made; and
(5) To recommend a series of specific changes in the data collection and dissemination systems that will improve the flow, timeliness, utility, and quality of the data.

Also, those invited were requested to be prepared to discuss the following basic questions:

Within the areas of maritime data you require or supply,

(1) What problems do you encounter with availability, timeliness, consistency, duplication, and accuracy?

TABLE 1

SUMMARY OF MARITIME INFORMATION COMMITTEE REGIONAL MEETINGS

INVITATIONS AND ATTENDANCE BY PARTICIPANT CATEGORIES

	WASHINGTON SEPT 1979		NEW ORLEANS NOV 1979		SAN FRANCISCO JAN 1980		ST LOUIS MARCH 1980		CHICAGO APRIL 1980		NEW YORK JUNE 1980		TOTAL INVITED	TOTAL ATTENDED	% ATTENDED INVITED	% TOTAL ATTENDANCE
	INVITED	ATTENDED	INVITED	ATTENDED	INVITED	ATTENDED	INVITED	ATTENDED	INVITED	ATTENDED	INVITED	ATTENDED				
CARGO CARRIERS													TOTAL CATEGORY		21.6	24.2
OCEAN CARRIERS & CONFERENCES	23	3	28	11	47	14	1	0	5	1	69	16	173	45	26.0	17.8
INLAND WATERWAY CARRIERS	0	0	9	2	2	0	18	5	30	1	2	1	61	9	14.8	3.6
SHIP CHARTERERS	0	0	0	0	0	0	0	0	0	0	6	0	6	0	0	0
LAND & AIR CARRIERS	8	1	1	1	19	4	6	0	2	0	6	1	42	7	16.7	2.8
FREIGHT MOVERS													TOTAL CATEGORY		6.6	4.3
SHIPPERS AND AGENCIES	5	0	12	1	7	2	6	1	55	4	18	4	103	10	9.7	4.0
FREIGHT FORWARDERS	2	0	3	0	0	0	0	0	5	0	4	0	14	0	0	0
PORT & WATERWAY PLANNERS & OPERATORS													TOTAL CATEGORY		12.8	9.1
PORT AUTHORITIES & PLANNERS	6	0	25	0	42	7	10	5	33	3	36	4	152	19	12.5	7.5
WATERWAY AUTHORITIES	4	0	0	0	0	0	0	1	1	1	1	0	6	2	33.3	0.8
MARINE TERMINAL OPERATIONS	0	0	1	0	4	1	2	0	10	0	5	1	22	4	9.1	1.6
SUPPORT ORGANIZATIONS													TOTAL CATEGORY		11.7	9
SERVICES, BROKERS, AGENTS	3	0	6	3	11	3	5	0	6	1	33	5	64	12	18.8	4.7
CLASSIFICATION SOCIETIES & PUBLISHERS	3	2	0	0	5	1	2	1	1	0	12	1	23	5	21.7	2.0
UNIONS & UNION SCHOOLS	4	2	0	0	9	0	0	0	10	0	2	0	25	2	8.0	0.8
BANKS & FINANCIAL INSTITUTIONS	1	0	2	0	2	1	0	0	58	0	8	3	71	4	5.6	1.6
LEGAL ADVISORS & INSURANCE	1	0	0	0	1	0	1	0	3	0	7	0	13	0	0	0
PLANNING & RESEARCH ACTIVITIES													TOTAL CATEGORY		14.7	16.7
REGIONAL AND STATE PLANNERS	0	0	0	0	2	1	13	1	11	5	2	2	28	9	32.1	3.6
CONSULTANTS & R&D GROUPS	43	7	3	1	16	6	2	0	7	1	48	10	119	25	21.0	9.9
UNIVERSITY RESEARCH & LIBRARIES	2	0	2	1	14	3	17	4	12	0	14	0	66	8	12.1	3.2
DESIGNERS & MANUFACTURERS													TOTAL CATEGORY		9.0	2.4
NAVAL ARCHITECTS & MARINE ENGINEERS	2	1	3	0	4	0	0	0	1	0	8	1	18	2	11.1	0.8
SHIPBUILDERS	7	0	5	0	7	0	4	1	11	0	3	0	37	1	2.7	0.4
EQUIPMENT MANUFACTURERS	1	1	1	0	2	0	0	0	0	0	8	2	12	3	25.0	1.2
PROMOTIONAL ORGANIZATIONS													TOTAL CATEGORY		14.5	4.3
TRADE ASSOCIATIONS	27	5	2	0	7	2	4	1	8	0	12	3	60	11	18.3	4.3
CHAMBERS OF COMMERCE & ENVIRONMENTALISTS	5	0	1	0	3	0	1	0	1	0	5	0	16	0	0	0
FEDERAL AND STATE GOVERNMENTS													TOTAL CATEGORY		33.3	30.3
DEPARTMENTS OF TRANSPORTATION	19	5	4	2	0	0	17	2	26	3	4	1	70	13	18.6	5.1
DEPARTMENT OF COMMERCE	29	10	3	2	6	3	1	1	5	2	8	3	52	21	40.4	8.3
TREASURY DEPARTMENT (CUSTOMS)	8	6	2	2	1	1	0	0	1	1	3	1	15	11	73.3	4.3
CORPS OF ENGINEERS	2	0	4	4	14	4	23	8	12	4	5	0	60	20	33.3	7.9
OTHER GOVERNMENT ACTIVITIES	18	6	5	3	3	2	0	0	3	0	5	1	34	12	35.3	4.7
TOTALS		49		33		55		31		27		58	1362	253	18.6	100.0

(2) What can be done to improve the collection and accessibility of needed data and to obtain them in a form most suitable to fulfill your requirements?

The expressed concerns of the participants soon channeled these meetings into a standard format that included discussion groups on three basic categories of maritime statistical data:

- Vessel Characteristics and Movements
- Ports and Waterways
- Cargo Characteristics and Movements

The last of these proved by far the most popular subject for discussion and, therefore, in several of the meetings, an additional discussion group was created dealing specifically with container and intermodal movements of cargo.

These meetings proved extremely successful and informative for the participants, for the committee, and for the government liaison representatives who were able to attend. A list of attendees for each of the regional meetings is included in the Appendices to this report.

Organization of the Report

This document essentially constitutes a report of the information obtained from these regional meetings, from government agencies, and from private organizations that process and disseminate maritime statistical data. It incorporates with this information the combined knowledge and experience of the committee members.

Chapter 2, "Uses and Users of Maritime Information," primarily covers uses of maritime statistical data that have been extracted from the regional meetings, the experiences of the committee, and information obtained from the sponsoring agencies and other major users in the federal government. Users are considered to be those who attended the regional meetings and their counterparts in other commercial or governmental organizations, the MTRB sponsors, and other government agencies that have expressed interest in developing and improving the maritime statistical data produced.

Chapter 3, "Maritime Information Systems," is a recapitulation of acquisition, processing, and dissemination procedures, and activities that are currently being undertaken by various government agencies and commercial organizations. It is essentially a statement of the way things are done now by several of these elements of the public and private sectors. The chapter also describes the changes that are currently taking place and that are planned for the future. This includes a rough schedule of when major changes may be anticipated and a general picture of the anticipated format in which future information will be made available to users.

Chapter 4, "Cargo Characteristics and Movements;" Chapter 5, Vessel Characteristics and Movements;" and Chapter 6, "Ports and Waterways," delineate the scope and nature of maritime information that is of specific interest to users. These chapters contain descriptions of the maritime statistical data discussed during the regional meetings as well as through other committee deliberations.

The regional meetings also evolved suggestions for systems improvements as well as analyzing the common problems of users and suppliers of maritime statistical data. Chapter 7, "Information Systems Management," investigates these information management problems and deals with the most likely solutions.

Finally, in Chapter 8, "Findings, Conclusions, and Recommendations," the Maritime Information Committee presents its concept of current deficiencies in data management systems, along with an analysis of the adequacy of the rate and coverage of anticipated progress in fulfilling the needs of users in the immediate and foreseeable future. Recommendations are given for improvements in those areas that seem inadequately covered, and suggestions are made as to how planned changes may be beneficially altered or expedited.

CHAPTER 2

USES AND USERS OF MARITIME INFORMATION

To evaluate current maritime data and statistics, identify major problem areas and shortcomings in the data, and recommend changes and procedures to improve the data, a good understanding of the uses and users of maritime data and statistics is needed. This understanding of the end uses of the information is a necessary framework or background for the succeeding work in this report. These uses serve as evaluation criteria in assessing needs for discrete pieces of information and in making recommendations on improvements in data collection, processing, and dissemination. This chapter will address maritime data uses and users.

Scope of Maritime Information Use

Maritime information is used by both the public sector and the private sector. Many uses are common to both. Uses of maritime data and statistics include the following:

- Formulation of national maritime and transport policy, national commerce regulation, control, and promotion
- Long-range planning
- Marketing
- Operations
- National defense
- Safety and health control.

This listing is in no particular order and does not indicate any type of a hierarchy or prioritization. Each of these uses is described briefly below and is intended to serve as an introduction to the subject. These descriptions are brief, since a thorough understanding and comprehension of the uses is easier if the uses are addressed coincident with a description of the users. Further discussion is included in the second part of this chapter.

Formulation of National Maritime and Transport Policy, National Commerce Regulation, Control, and Promotion: These uses of information are primarily a government concern on the federal level. They include

monitoring the current status of the U.S. balance of trade, controlling imports into the U.S. and assessing customs duties levied upon them, regulating foreign entity activities in U.S. commerce, and promoting the U.S. flag merchant marine as a matter of policy.

Long-Range Planning: Long-range planning is a predominant use of maritime data and is common to both the public and private sectors. Long-range planning uses are numerous and varied. These uses include such facets as planning the maintenance and development of the nation's ports and harbors, intracoastal and inland waterways, planning future vessel and shipyard technology, and planning penetration of a new market segment by an individual carrier. Long-range planning represents a need for and a use of information of extreme importance to the nation's maritime industry.

Marketing: In the market analysis and market research functions of the maritime industry, good and complete information is a necessity. Many industries readily exchange information for purposes of marketing and for other functions. Use in marketing is primarily a private sector function although it is also important to semi-governmental port authorities. Marketing uses include the following:

- Market share analysis
- Trade analysis
- Competitive transportation mode studies
- Marketing program and staff development.

Operations: Maritime information, used for operations purposes, to a large degree, serves as a control function. Operational uses include equipment positioning and control and personnel control. Of all the uses, this one is probably the most varied, depending upon what the operations of the users entail. Compared to the other uses, the operational use of information tends to be for day-to-day, current-action type purposes. Thus real time information is in demand for most operational utilization purposes.

National Defense: For national defense, maritime information serves a control and intelligence function. National defense involves such functions as monitoring the foreign vessels that enter U.S. ports and the monitoring of the movements of U.S. vessels.

Safety and Health Control: Information on hazardous, contaminating, and restricted cargoes is important for safety and health control. In a transportation network, it is extremely important that hazardous cargoes be identified. This identification allows U.S. carriers handling commodities, and government agencies regulating transport, to take the necessary precautions to provide for the safety of the public. Equally important is the control of cargoes entering the United States from foreign countries. Potentially dangerous cargo must be identified to provide adequate safeguards. As in the case of

operational use, the identification and location of hazardous cargoes is needed on a real time basis.

Users of Maritime Statistical Data

This section is addressed to specific uses involving specific users. Earlier it was pointed out that there are both primary and secondary users of maritime statistical data. The primary users operate under a mandate, either to produce statistical data as a part of their governmental or private sector functions, or their mandate calls for performing some function that cannot occur without such statistics being available; consequently the primary user normally has the facilities for acquiring and processing the needed basic data. The secondary users, on the other hand, may not have basic data acquisition and processing capabilities but must rely upon what can be gleaned from those applicable processed data that are made available by primary users. In some instances, particularly within the federal government, different agencies may be involved in the acquisition, processing, and dissemination of statistical data to both primary and secondary users.

The regional meeting participant categories attendees listed in Table 1 give some indication of the types of organizations that deal with maritime statistical data. The total mix of attendees, however, included collectors and processors as well as users but, with selective sorting of the information discussed therein, as well as analysis of backup information evolving from the meetings, it is possible to develop an overall picture of the relative utilization of maritime statistical data by various elements of both the public and the private sectors.

Public Sector Users of Maritime Data and Statistics: The public sector uses maritime information for regulatory and control purposes as well as for promotion purposes. The federal government users include the following:

- Department of Agriculture.
- Department of Commerce
  - Maritime Administration.
- Department of Defense.
  - Military Traffic Management Command. (MTMC)
  - Military Sealift Command. (MSC)
  - U.S. Army Corps of Engineers.
- Department of Transportation.
  - U.S. Coast Guard
  - Saint Lawrence Seaway Development Corporation
  - U.S. Railroad Administration
- Department of Treasury.
  - U.S. Customs Service.
- Federal Maritime Commission.
- Tennessee Valley Authority

There are many other governmental users at the federal and state level. These users include inland and deepwater port authorities, coastal zone management offices or agencies, state departments of transportation, and regional planning commissions. Other federal government agencies, as well as those above, are concerned with data and their publication as a service to the public and the government. The Bureau of the Census is a prime example of this; its role will be discussed in greater detail in Chapter 3 whereas the functions of the other maritime data users are discussed below.

Department of Agriculture: The Department of Agriculture's Animal and Plant Health Inspection Services (APHIS) relies on inbound ship manifests to determine which of the cargoes it must inspect to insure that there is no infestation of incoming cargoes or packaging materials by undesirable species, native to the exporting or transshipment countries. This inspection process is based on a spot inspection form of data collection.

The Department of Agriculture also has a program of grain inspections for exports at the ports of export and uses foreign trade data in its foreign agricultural development and assistance programs.

Department of Commerce/Maritime Administration: The Department of Commerce maintains data on U.S. exports as part of its functions pertaining to the monitoring of the current status of the U.S. balance of trade. Maritime data are used to promote U.S. export trade and to protect U.S. industries from excessive foreign competition by judicious use of import quotas. Foreign trade statistics are also used to measure the impact of trade and tariff concessions under the General Agreement on Tariffs and Trade (GATT) and the Generalized System of Preferences (GSP).

The Department of Commerce's Maritime Administration (MarAd) uses maritime data and statistics in its promotion of the U.S. flag merchant marine. MarAd employs vessel operations data and trade statistics to update continually its assessment of the need for additional U.S. flag cargo ships. The result of this process is the granting of operating differential and construction differential subsidies to U.S. businesses.

The Maritime Administration also uses maritime data and statistics to monitor U.S. ports. MarAd collects and uses port information in order to be prepared to assume responsibility for and take control of U.S. ports in wartime. (According to the Defense Protection Act of 1950 and Executive Order 11490, MarAd is responsible for port mobilization planning to assure the effective use of port facilities in time of war or other emergency.) This agency is both a primary and a secondary user of maritime information. Some financial, trade, and operating information is collected from U.S. flag carriers for use in monitoring their activities. The Maritime Administration is a secondary user of information from both the Bureau of the Census and the Corps of Engineers.

In support of its national security responsibilities, the Maritime Administration requires operators of U.S. flag vessels engaged in the foreign trade to report their position every 48-hours. This U.S.

Merchant Ship Locator System is known by the acronym USMER. The ship location data are transmitted to the U.S. Naval Ocean Surveillance Information Center (NOSIC) and integrated there with NOSIC's worldwide ship location information. They are also transmitted to the Coast Guard's AMVER Center.

Department of Defense: The Department of Defense uses vessel movement data to identify the ships that have entered U.S. ports and to monitor the location and recent activities of U.S. and foreign fleets on a worldwide basis. The Department of Defense's Ocean Surveillance System is an important national defense user of maritime information.

The two major military traffic organizations (MTMC and MSC) use maritime statistics to monitor carrier activity and to determine vessel suitability for transport of military cargoes.

The Department of the Army's Corps of Engineers utilizes vessel movement and cargo volume data to determine the necessity of upgrading or improving harbor facilities and waterway channels and locks to handle anticipated vessel traffic and commodity movements. The Corps' use of maritime information is primarily for long and intermediate range forecasting and planning for waterway and harbor operation, maintenance, modernization, and improvement. A highly significant additional use of maritime information by the Corps is for current operation and short range operating improvements to the locks and dams operated by the Corps of Engineers.

The Corps of Engineers is both a primary and a secondary user of information. Ocean vessel movements and foreign trade statistics are utilized by the Corps; they are provided by the Bureau of the Census from Customs Service documents. As a primary user, the Corps collects and utilizes information on domestic vessel and commodity activity in ports and harbors and through locks and waterway channels.

Department of Transportation: The Department of Transportation (DOT) uses maritime information as necessary in its programs. For example, the U.S. Railroad Administration uses maritime statistics to assess railroad activity and bottlenecks at rail/vessel interchange points.

U.S. Coast Guard: The U.S. Coast Guard, as a major Department of Transportation agency, is responsible for regulation of navigation and the documentation and inspection of vessels. Maritime vessel information is useful in that function. An example of the Coast Guard's need for maritime information is the use of vessel manifests to determine cargoes that may be hazardous in nature in order to assure that those cargoes are given proper and safe handling and, where necessary, are separated from other cargoes to avoid creating a potentially more dangerous situation.

The U.S. Coast Guard also collects and uses many other forms of maritime statistical data of importance in fulfilling its legal mandates but these are not central to the scope of this study. These other forms of maritime data include such information as casualty data and small craft statistics.

Department of Treasury/U.S. Customs Service: The Customs Service assesses customs duties on imported cargoes and is responsible for identification of cargoes that are prohibited entrance into the United States. The Customs Service uses the vessel manifest as well as other import documentation such as import entry forms to carry out this function. This is a day-to-day commerce regulation and control use of maritime information.

The Customs Service is the primary collector of the manifest information which is passed on to the Bureau of the Census where it becomes input for other data processing and dissemination systems.

Federal Maritime Commission: The Federal Maritime Commission (FMC) uses vessel movement and utilization data as well as trade statistics in its regulatory function. The FMC regulates the waterborne foreign and domestic offshore commerce of the United States. The FMC uses maritime data in various analyses such as assessing the impact of a carrier conference or of working agreements on foreign trade, the competitive environment, and the shipping public.

Other Federal Users: Other federal departments and agencies do or could use maritime information in regulatory, control, or analysis functions. These uses would, however, not be to the extent of use of the federal users previously discussed. These users include, among others, the Interstate Commerce Commission (ICC), the Department of Energy, and the Civil Aeronautics Board.

Port Authorities: Port authorities are usually arms of state or local governments and are thus part of the public sector users of maritime data and statistics. Port authority use of maritime information is, however, very similar to the private sector use. Port organizations use such information for marketing, operational functions, and long-range planning. Since port authorities' capital funds generally come from revenue bonds, local property taxes, or state grants, port authorities need the data pertaining to cargo movements through their ports as well as competitive ports to justify further development of their port facilities at public expense. This justification is based on the premise that for every dollar of cargo handling revenue generated in a port, there is an economic impact and multiplier effect in the surrounding region which eventually reimburses the public for the costs it has agreed to bear in helping to finance the port development.

Other State and Local Government Users: There are numerous other state and local government entities that use maritime information to a greater or lesser degree. These users include state departments of transportation, and coastal zone planning, economic development, and other regional and local planning commissions.

Private Sector Users of Maritime Statistical Data

The private sector uses maritime data and statistics for long-range planning, marketing, and operational purposes. The primary private sector users are ocean carriers, conferences of carriers, consultants, and university research organizations. Freight forwarders and proprietary shippers do not appear to be major users of statistical data. In the following discussion of users, specific examples of information utilization will be cited.

Ocean Carriers: Ocean carriers use maritime information for a variety of marketing and market analysis purposes. Major marketing uses of foreign trade data include the following:

- Carrier market share analysis
- Country, port, and commodity trade analysis
- Competitive transportation mode studies
- Identification of potential new markets
- Forecasting
- Competitive analysis
- Rate studies
- Market program and staff planning.

This information is used as input into operational and traffic decisions such as itinerary of the vessels, which types of vessels to use in a particular trade, and the characteristics of cargo handling equipment required. Long-range planning of vessel and equipment requirements is also facilitated by the use of maritime information.

Another component of carrier use of data is related to shipping conference applications. A shipping conference monitors the carriage of its members. Conferences also monitor their penetration of hinterland cargoes in comparison to other conferences which may be competing for the same cargo market. Foreign trade statistics are necessary in consideration of and justification for anti-trust immunities for conferences, and for other carrier agreements.

These applications by no means represent an exhaustive coverage of carrier uses of information but should indicate the importance of maritime data in a carrier's day-to-day operations and effective long-range planning.

Inland Waterway Carriers: The inland waterway carriers have many of the same interests and uses as the ocean carriers except that they relate to waterway and intracoastal movements. They have additional uses for maritime statistical data since the advent of user charges and also in operation of their equipment using locks and dams on the inland waterway system.

Consultants and University Research Organizations: Although consultants and university research organizations are important users of maritime information, their work is usually conducted for another user in the public or private sector, e.g., the use of trade balance

figures to forecast exchange rate fluctuations or to forecast the effect of exchange rate changes on the domestic cost price index. These analyses are then provided to federal monetary control agencies such as Treasury, Federal Reserve Board and to the Congress. Consequently, their uses and applications of maritime information, to a large degree, overlap those stated elsewhere in this chapter.

Shipbuilders, Ship Designers, and Equipment Manufacturers: Shipbuilders, ship designers, and equipment manufacturers would use maritime information. However, the lack of participation in the regional meetings indicated in Table 1, led to further inquiries as to the interest of these elements of the public sector. As a general rule, shipbuilding, design, and equipment manufacturing projections do not ordinarily rely entirely upon maritime statistical data of the type dealt with herein. However, it is evident that published maritime statistical data are available to these organizations and are utilized to some extent in developing new designs and markets.

Other Private Sector Users: There are numerous other private sector interests which use maritime data and statistics to a lesser degree. Some of these will be touched upon briefly here.

Inland waterway and land carriers use maritime data as market intelligence data. This intelligence allows carriers to determine the demand for, and required nature of their services to meet the needs of the shipper in getting his cargo to seaports and connecting efficiently with the services of deepwater carriers. Due to the development of mini-bridge and micro-bridge cargo movements, railroads and, to a lesser degree motor carriers, are particularly interested in foreign trade movements and data.

Firms involved in the shipment of cargo, such as shippers, freight forwarders, and terminal operators sometimes use maritime information, but their lack of interest in the regional meetings illustrated by Table 1 seems to suggest that they are not unduly concerned about changing the form of currently available data. Many major industrial firms are also owners of marine equipment for transport of their raw materials or finished goods. These include major petroleum companies, electric utilities, the steel industry, coal companies, and others. Maritime statistical data are used in the operation and planning for both the long and short range by these companies.

The uses and users of maritime information are diverse and growing. Maritime data are an absolute necessity in national commerce promotion and control. The carriers of our national commerce also consider maritime information necessary for their operations. As the demand for efficient transportation grows, and as the technology of the maritime industry improves, the demand for accurate, complete and timely maritime data and statistics will increase.

CHAPTER 3

MARITIME INFORMATION SYSTEMS

Introduction

There are a limited number of sources from which statistical data and information can be extracted for maritime purposes. The major sources, housed in the federal government, result from legislative mandates to collect pertinent information. In large measure the information is for the sources' own internal use and responsibilities. The major federal agencies collecting, using, documenting, and making such data available in various forms or aggregations to the public, are discussed in this chapter. Also discussed are non-government agencies that are involved in similar types of maritime statistical data activities. The principal emphasis at this point is placed upon identification of the originators, the data acquisition methods and scope, and to some extent, mainly for exemplary purposes, the processing and storage of such information. This is generally followed by a listing of major publications of such public and private organizations. Virtually all of these reports are listed, indexed, and described in "Maritime Information Sources: A Guide to Current Data" [3].

In addition to the agencies discussed in this chapter, the following federal agencies also collect and publish some maritime and related data:

- The Civil Aeronautics Board has statistical responsibilities for financial, traffic, and operating statistics of U.S. domestic and international air carriers and publishes data bearing thereon.
- The Interstate Commerce Commission is responsible for, collects, and publishes financial, traffic, and operating statistics on railroads, certain classes of water transportation (regulated inland and coastal), domestic freight forwarders, certain classes of contract and common carrier highway transportation as well as oil pipelines. (Gas pipelines are treated as a utility and thus are controlled by the Federal Power Commission.)
- The Department of Energy gathers data on the domestic and international supply, demand, production, and conservation of

virtually all forms of energy and energy materials. Transportation is a major consumer of energy as well as providing the means to deliver energy resources from origin to point of consumption.

- The Department of Commerce, as distinguished from the Maritime Administration, collects, organizes, and analyzes transportation related data in support of domestic industry and international trade programs. It also produces periodic and special reports of interest to domestic and international business.
- The Saint Lawrence Seaway Development Corporation reports statistics on the movement of ships through the Saint Lawrence Locks and the Welland Canal. Data reported include size and type of vessel, origin, destination, and cargo on- and off-loaded by commodity.

The Bureau of the Census

The Census Mandate: The Secretary of Commerce is authorized to collect information from all persons exporting from or importing into the United States and the non-contiguous areas over which the United States exercises sovereignty, jurisdiction, or control, or from the owners or operators of carriers engaged in such foreign commerce, and shall compile and publish such information pertaining to exports, imports, trade, and transportation relating thereto as he deems necessary or appropriate to enable him more rapidly to promote, develop, and further the commerce, domestic and foreign, of the United States, and for other lawful purposes [4]. This requirement results in the production of a myriad of information, statistics, and projections.

Census Import Data Acquisition: The basic import data are initially compiled in terms of the commodity classifications in Tariff Schedules of the United States Annotated (TSUSA). In reports such as FT 135 and IM150/155, the TSUSA data are presented in terms of a rearranged commodity classification system, namely, Schedule A, "Statistical Classification of Commodities Imported Into the United States," which is based on the Standard International Trade Classification (SITC), Revision 2 [5]. Schedule A was constructed by the Bureau of the Census in order to provide for the summarization of data for the approximately 10,000 TSUSA classifications into about 3,000 commodity groupings which are meaningful in terms of commodities important in the U.S. import trade and, at the same time, to provide data in terms of the Standard International Trade Classification outline which are comparable, insofar as possible, to the foreign trade statistics compiled by other trading nations [6].

The official U.S. import statistics are compiled by the Bureau of the Census from copies of the import entry and warehouse withdrawal forms which importers are required by law to file with Customs Service officials. The information as to country of origin, net quantity, value, and commodity classification is verified by Customs Service

officials on 100% of the entries filed for transactions valued over $250 and a 1% sample for transactions valued at less than $250 [6]. The specific import source forms include:

- Customs Form 7501 - Consumption Entry
- Customs Form 7502 - Warehouse or Rewarehouse Entry
- Customs Form 7512 - Transportation Entry and Manifest of Goods Subject to Customs Inspection and Permit
- Customs Form 1400 - Record of Vessels Engaged in Foreign Trade-Entered or Arrived Under Permit to Proceed

Consumption Entry, and Warehouse and Rewarehouse Entry are prepared by the importer or his agent and submitted directly to the Customs Service (Customs). After a review of the documents by Customs, copies of the entries are transmitted to the Bureau of the Census for processing. The Transportation Entry and Manifest of Goods Subject to Customs Inspection and Permit follows the same procedures. The Record of Vessels Engaged in Foreign Trade - Entered or Arrived Under Permit to Proceed is prepared by the Customs Service based on information shown on the vessel manifest. Copies of this form are also transmitted to the Bureau of the Census for processing.

Census Import Data Processing: The import documents are received on a daily basis from the Customs Service. To illustrate some of the processing procedures followed by the federal agencies engaged in the collection of maritime data, there are described below the major steps and documentation employed by the Bureau of the Census in such actions.

The manifest is listed on the Record of Vessels Engaged in Foreign Trade - Entered or Arrived Under Permit to Proceed with a unique manifest number. From these data the Monthly Vessel Entrances in Customs District, Port, and Manifest Number Arrangement (Census Form AE 350) is produced. Using the vessel code, the port of unlading, and the date of importation, the computer finds the vessel movement on the AE 350; the vessel information is added to the record, and the SM 304 file is created. The SM 304 file is used to create many reports for the Corps of Engineers, shipping companies, etc. The SM 305/SM 305 IT reports are also generated from the SM 304 file. The SM 305 presents shipping weight and value information in terms of the port to port, type of service (liner, tanker, tramp), commodity, and country of origin factors. The SM 305 IT (In Transit) reflects cargo arriving in the U.S. for transshipment to another foreign country.

Census Import Statistical Data Dissemination: After the acquired data have been processed, the following publications are issued by the Bureau of the Census:

- FT-135 - U.S. General Imports - (Monthly)
- FT-150 - General Imports - (Annually)
- FT-155 - General Imports - (Annually)

- FT-210 - Imports for Consumption and General Imports - (Annually)
- FT-246 - Imports for Consumption and General Imports - (Annually)
- SM 305/305 IT (Monthly) U.S. Waterborne General Imports and
  SA 305/305 IT - (Annually) Inbound Transit Shipments

Census Export Data Acquisition: The basic export statistics are initially collected and compiled in accordance with the commodity classifications in Schedule B, Statistical Classification of Domestic and Foreign Commodities Exported from the United States. The official U.S. export statistics are compiled by the Bureau of the Census primarily from copies of Shippers Export Declarations which are required to be filed with the Customs officials. An exception is the Department of Defense Military Assistance Program Grant shipments which are reported directly to the Bureau of the Census by Defense, and shipments by qualified exporters who have been authorized to submit data in the form of magnetic tape, punched cards, or monthly Shippers' Export Declarations directly to the Bureau of the Census [6]. The specific export source forms include:

- Commerce Form FT 7525 - Shipper's Export Declaration
- Commerce Form FT 7513 - Shipper's Export Declaration for In-Transit Goods
- Customs Form 1401 - Record of Vessels Engaged in Foreign Trade-Cleared or Granted Permit to Proceed

The Shipper's Export Declaration (SED) is prepared by the exporter or his agent and submitted to the exporting carrier, and by the exporting carrier in turn to the Customs Service at the U.S. ports of exportation prior to departure, or in the case of "bond," within four days following departure of the vessel. The SEDs are then transmitted by the Customs Service to the Bureau of the Census for processing. The Shipper's Export Declaration for In-Transit Goods (Census Form 7513) follows the same procedure. The Record of Vessels Engaged in Foreign Trade - Cleared or Granted Permit to Proceed (Census Form 1401) is prepared by the Customs Service based on information shown on the vessel manifest. Copies of this form are also transmitted to the Bureau of the Census for processing.

Census Export Data Processing: The export documents are received on a daily basis from the Customs Service. To illustrate some of the processing procedures followed, there are described below the major steps and documentation employed by the Bureau of the Census.

A manifest cargo declaration is required by Customs when a vessel is cleared or granted permit to proceed. The manifest is assigned a number and is listed on the Form 1401-Record of Vessels Engaged in Foreign Trade - Cleared or Granted Permit to Proceed. These forms are processed by the Foreign Trade Division (FTD), Bureau of the Census, Suitland, MD. Census receives these forms from approximately 135 Customs ports. This Customs Form 1401 is used to produce Census file

AE 750 Monthly Vessel Clearances in Alphabetical Vessel Name Arrangement. There are approximately 8,000 records per month to be included in this file.

The carrier must also furnish Commerce Forms FT 7525 or FT 7513 covering the cargo at the time of clearance or four days after clearance under bonding provisions. Customs sends these documents to Jeffersonville, IN. These documents are entered into a Census computer data file called the FT 521 Detail File. This form embodies U.S. Exports by Schedule B number, by Country of Destination, and by District Exportation, with domestic and foreign merchandise origin being shown separately.

The Customs District Port code and the vessel manifest number are unique for a particular vessel departure from a specific port. The FT 521 detail listing and in-transit data are merged with the AE 750 file to create the SM 704. This latter file is used to produce waterborne commerce reports and most special reports for users. From the SM 304, the SM 705 is created. These U.S. Waterborne Export files are:

- SM 705 (Exports) Domestic and Foreign Merchandise
- SM 705 IT (EXP II) Outbound In-Transit Merchandise SM 705

Census Export Statistical Data Dissemination: Major census foreign export trade-transportation publications include:

- FT 610 - U.S. Exports of Domestic Merchandise (combined modes of transportation) - (Annually)
- FT 990 - Highlights of U.S. Export and Import Trade - (Monthly)
- FT 410 - U.S. Exports Schedule E Commodity by Country (combined modes of transportation) - (Monthly)
- SM-705/705 IT - Exports and Outbound In-Transit - Shipments Monthly and SA 705/705 IT - (Annually)
- FT 455 - U.S. Exports of Domestic Merchandise - (Annually)

Future Plans of the Bureau of the Census: The major federal agencies providing maritime data are in the process of making system changes of various types to improve efficiency and/or planning for further changes in the near term or longer range future. These will affect both input to the Bureau of the Census and their outputs. Some of these current or contemplated changes are described below.

- SM 305/SM 705 tapes will have seven-digit commodity descriptions effective January, 1981.

Additional computer hardware and a data management system will allow for the generation of more complex reports within the next two to three years; examples of which are:

- Cargo movement in terms of both port of unloading and port of entry (where merchandise is received by importer).
- Cargo movement into or out of a port by draft of vessel.

- Cargo movement (by type of vessel, such as: barge, tanker, etc.)
- Import and export statistics by month of clearance or entries rather than month proposed (statistical month).

It is hoped within the reasonable future to be utilizing the employer's identification number, as reported on the shipper's export declaration, for port of origin for exports. Within the next five to ten years the reporting of export data by electronic means is anticipated for steamship lines and airlines; also the reporting of vessel movement data and import data to Customs by computer-to-computer communications is expected to occur.

Corps of Engineers

The Corps of Engineers of the Department of the Army (Corps) is responsible for the development and maintenance of United States inland and coastal waterways and harbor channels for commercial water transportation and other purposes. To provide information to carry out that responsibility assigned by Congress, the Corps collects, processes and publishes data on four domestic marine data programs. These are discussed in the following paragraphs and are: (1) domestic waterborne commerce, (2) performance monitoring system for locks, (3) port characteristics, and (4) domestic shipping lines.

Domestic Waterborne Commerce: Waterborne traffic movements, other than those for lock activities, are reported to the Corps of Engineers by all vessel operators of record for those movements of their vessels which were classified as domestic traffic; namely, between United States ports (continental and non-contiguous), and on the inland rivers, canals, and connecting channels of the United States, Puerto Rico, and the Virgin Islands, excluding the Panama Canal Zone which is treated as foreign commerce. The reports are generally submitted on the basis of a vessel movement completed in one direction. The origin and destination of each individual commodity for movements with cargo over water are also reported.

Cargo moved for the military agencies in commercial vessels is reported as ordinary commercial cargo; military cargo moved in Department of Defense vessels is omitted from these statistics.

The Corps' Waterborne Commerce Statistics Center (WCSC) of the Water Resources Research Center is the focal point in the receipt, preparation, processing, and dissemination of domestic waterborne commerce data. Commodity and vessel trip data for domestic movements are provided to the Corps district offices by vessel operators. The data are submitted on a multiplicity of forms and in various formats. The completed forms are received from vessel operators by statistical clerks at Corps district offices headquartered within the particular Corps district boundaries. The district statistical clerks perform a preliminary review of the submitted documents and encode vessel and operator names. The documents are mailed to the WCSC for further

verification and processing. Cover letters are attached for the purposes of document control.

The vessel operator reports are received at the WCSC and a thorough system of manual document control is effected to ascertain the integrity and completeness of data submitted. The vessel operator reports are manually reviewed to determine if incorrect, questionable, or incomplete information has been reported.

The WCSC receives reports from wharf and dock operators. These wharfage and dockage reports are used to verify the completeness and accuracy of data submitted by the vessel operators. The WCSC monitors the reporting of operators, and sends delinquency letters to districts from which reports are not submitted in a timely manner.

Upon determining that the data are reasonably complete and correct, the WCSC staff records document control data and forwards the vessel operator reports to a private sector contractor for encoding and keypunch.

Data for foreign movements are provided directly to the WCSC from the Bureau of the Census on an annual basis. Lock Performance Monitoring System (PMS) data are collected by designated Corps districts, and vessel traffic data are used by the WCSC to check and verify alternate waterway routes taken by a vessel when more than one possible route can be followed.

Annual publications by the Corps of Engineers are available in five volumes and contain both domestic and foreign waterborne commerce data under the title of Waterborne Commerce of the United States by the Department of the Army, Corps of Engineers. The five volumes based on areas covered are as follows:

Part 1-Atlantic Coast
Part 2-Gulf Coast and Mississippi River and Antilles
Part 3-Great Lakes
Part 4-Pacific Coast, Alaska and Hawaii
Part 5-National Summaries

The data reported in the publication are the foreign imports and exports and the domestic receipts and shipments (by types of traffic) of waterborne commerce at U.S. harbors and along waterways. Cargo data are reported in the four-digit commodity classification for domestic waterborne commerce. All foreign trade data published by the Corps of Engineers are furnished to the Corps by the Bureau of the Census. The data are confined to movements by water and are domestic merchandise for exports; re-exports of foreign merchandise are termed exports in Corps reports. The imports include inbound merchandise for direct consumption and entries in custom bonded storage and warehouses. Intransit merchandise (defined by the Bureau of the Census as merchandise coming into the United States from a foreign country and shipped to a foreign country without having been entered as an import is treated as an import) in Corps reports if unloaded from a vessel and as an export if loaded on a vessel. Foreign trade data of territories and possessions other than Puerto Rico and the Virgin Islands, which

are under the jurisdiction of the Department of Interior, are not furnished to the Corps of Engineers by the Bureau of Census.

Data regarding drafts of vessel arriving and departing U.S. harbors are also reported in the waterborne commerce reports Part 1 through 4. Part 5 contains national summaries and a section on domestic inland traffic areas of origin and destination of principal commodities. The publications are furnished to all U.S. depository libraries and are for sale by several Corps offices including the U.S. Army Engineer District, New Orleans, P.O. Box 60267, New Orleans, Louisiana 70160. Special tabulations of waterborne commerce data are available upon request to the U.S. Army Engineer, Water Resource Support Center, Institute for Water Resources, Kingman BUilding, Ft. Belvoir, Virginia 22060.

Performance Monitoring System: The Performance Monitoring System (PMS) has been developed by the Corps of Engineers to provide Corps planners and operations personnel with data and computer programs needed for analysis of the operation of locks on the inland and intracoastal navigation systems. Output from the PMS can also be utilized in the inland navigation systems analyses conducted as a part of project and special planning studies.

The PMS data base was begun in 1975 to collect a one-hundred-percent sample of information concerning commodity and vessel traffic and lock operations for the locks that are in operation on the U.S. inland waterways. Statistics are gathered for each transit through each lock and include lift at the lock, weather conditions at the time of transit, surface conditions, and the lockage log (vessel name and number, direction of transit, arrival time, start of lockage time, entry time, end of entry time, start of exit time, and end of lockage time). There is also a vessel log obtained from the vessel operator, which gives vessel type, characteristics of the vessel, and information on the commodity being moved through the lock. The data are forwarded to the district offices of the Corps of Engineers where they are checked for accuracy, processed, and stored in a central library of tapes. The library is currently maintained on the Boeing Computer Service (BCS) computers in Seattle, Washington, where the data can be used directly on the BCS system by Corps personnel. Special computer runs can be performed, and reports produced, upon individual request, provided that commercial confidentiality is protected.

The types of source reports prepared are as follows:

- Shift Log (form ENG 3102a). This form is completed each time there is a shift change at a lock and each time there is a significant change in navigation conditions. It describes weather and navigation conditions.
- Lockage Log (form ENG 3102b). This form is completed by the lock operator for each vessel transiting the lock. When small craft or recreational vessels are locked with other vessels, a separate form is not completed for them. Data collected include vessel name and number, direction of the vessel, number of cuts (number of units into which a barge tow must be

divided to pass through a lock), lockage and vessel type, entry and exit time, arrival time, lockage time, and a description of any factor which may have interferred with the lockage.

- Vessel Log (form ENG 3102c). This form is completed for commercial tows and cargo-carrying vessels. It is completed by the vessel operator or by the lock operator with information supplied by the vessel operator. It contains the vessel name and number, information on assisting vessels, dimensions of the flotilla, number of passengers, barge types, number of barges, the type and tonnage of each commodity, and whether or not the vessel has stopped since its last lockage.
- Detailed Vessel Log (form ENG 3102d). Under special conditions, and only when authorized, this form may be used in place of the Vessel Log. In addition to the information on the Vessel Log, this form contains the name and vessel number of small craft locked with the loaded vessel, the identification number of each barge, the origin and destination of commodities carried, and whether or not the commodity is hazardous.

Time-frame for collection and dissemination is such that data are collected as events occur. At the end of each month, the data for that month are encoded and edited. They are to be available for addition to the central data-base within two months following the month during which they were collected. Thus, there may legitimately be up to three to four months lapse between the time an event occurs and the time it is available for analysis.

The Corps advises the respondents that every reasonable precaution will be taken to avoid revealing the identity of any individual shipper, receiver, or vessel operator providing such confidential information.

The PMS data are placed in a central data base after editing. They are available for processing through any of approximately 45 analytical routines for report generation. These reports are available for use by the private sector of the maritime industry and all echelons of the Corps upon request. Thus, the PMS performs an automated statistical tabulation of lock and waterway operations which produces monthly, yearly, and on-request reports [7].

Reports that are produced by the PMS reporting system include the following [8]:

PMS-3E, Lock Analysis Report
PMS-3F, Lock Analysis Report
PMS-4, Stall Analysis Report
PMS-5, Vessel Frequency Analysis Report
PMS-6, Lock Utilization Analysis Report
PMS-8, Exceptional Performance Events Report
PMS-10, Exceptional Performance Summary Report
PMS-12, Commodity Barge-Type Report
PMS-13, Arrival Frequency Analysis Report

PMS-14, Interarrival Distribution Report
PMS-15, Delay Time Frequency Analysis Report
PMS-16, Horsepower Frequency Distribution Report
PMS-17, Tow Transit Analysis: Detailed Vessel Report
PMS-18, Tow Transit Analysis: Detailed Lock Report
PMS-19, Tow Transit Analysis: Summary Report
PMS-20, Detailed Tow Company Analysis Report
PMS-21, Tow Company Summary Report
PMS-22, Maritime Administration: Lock Tonnage Report
PMS-23, Maritime Administration: Lockage Report
PMS-24, Lock Utilization Summary Report
PMS-25, Lock Performance Summary Report
PMS-26, Lock Delay Summary Graph
PMS-27, Lock Service Summary Graph
PMS-28, Lock Queue Summary Graph
PMS-29, Tows Processed
PMS-30, Kilotons Processed
PMS-31, Percent Utilization
PMS-32, Total Barges Processed
PMS-33, Percent Empty Barges Processed
PMS-34, Total Delay Time
PMS-35, Average Delay Time
PMS-36, Barges/Hour of Tow Processing Time
PMS-37, Tons/Minute of Tow Processing Time
PMS-38, Kilotons/Tow
PMS-39, Kilotons/Lockage
PMS-40, Tows/Day
PMS-41, Kilotons/Day
PMS-42, Barges/Day
PMS-43, Barges/Tow
PMS-44, Other Vessels/Tow Lockage
PMS-45, Average Processing Time/Tow

Port Characteristics: The Port Series Reports are detailed compilations of data pertaining to available facilities at U.S. ports, including the physical characteristics of marine terminals, intermodal transportation services, marine repair services, bunkering stations, available channels, anchorages, and basins, and other related items. These reports are prepared by the Water Resources Support Center. The mission stemmed from an Act of Congress in 1918. Later acts, principally the Transportation Act of 1920 and Merchant Marine Act of 1920, affirmed the role of the Corps of Engineers in the collection of port information.

Port reports are prepared by civil engineers and transportation specialists who visit each port studied and make detailed surveys. There are approximately 45 reports that have been published on about 125 ports of the United States. These reports are revised periodically as funds and manpower permit. The revision cycle runs between 6 and 12 years. Beginning in Fiscal Year 1981 reports will be prepared on approximately 20 more ports, such as St. Louis and Pittsburgh, that serve only shallow draft vessels on the inland waterways.

Domestic Shipping Lines: Transportation Lines of the United States is an annual publication containing an inventory of American domestic commercial shipping vessels and the companies operating them. Its' three volumes include Transportation Series 3 covering the Great Lakes System, Series 4 on the Mississippi River System and Gulf Intracoastal Waterway, and Series 5 on the Atlantic, Gulf, and Pacific Coasts.

The data base is maintained by WCSC through regular coordination with Corps district commercial statistics personnel and annual review by vessel operating companies. Vessel data elements include name or number, type and construction, operating company, net register tonnage, length, breadth, draft, capacity, highest fixed point above water, cargo handling equipment, operating base, and year built or rebuilt. Operator data elements include name, address, Corps district location, type of service, principal commodities carried, and areas served.

Future Corps Plans for Data Base Developments and Improvements: The Corps is developing a domestic water/rail commodity traffic data base that will contain Corps' WCSC domestic waterborne commerce and ICC rail carload waybill data and the various important geographic and commodity codes. It will be possible to analyze historic movements and project water and rail traffic over various links and modes for various geographic units and commodity codes under a variety of conditions. There will be standard programs and reports and interactive access, i.e., two way communication between the users and the data bank.

The foreign waterborne commerce revised data base will contain Customs/Census/Corps foreign waterborne commerce data. Analysis of port-to-port traffic will be possible using standard programs/reports and interactive access.

Also being developed is a vessel characteristics data base. This will contain the Corps' Transportation Lines of the United States data base and the Coast Guard's Merchant Vessel Documentation System data base, and other important U. S. and foreign data files. Domestic data may be combined into a master file containing most important data elements. This common data base could reduce reporting to and processing by both the Corps and the USCG. There will be standard programs/reports, interactive access, and published reports containing summary data for U. S. and major regions by various data element characteristics. The Corps presently can only match about 75 percent to 80 percent of vessels on its two data bases. They are being merged and matched with each other and also merged and matched against USCG's two files to ensure total coverage. The Corps' data are used for the existing publications, but there are no analytical programs or data bases.

A vessel movement/utilization data base, currently nearing completion, will contain domestic movements. Utilization will be in terms of type/size groups, month/quarter/year time periods, commodity, and for the U. S. and its regions. Interaction with the commodity data base could indicate the percent of loading for vessel movements. Another approach toward analysis of vessel movements/utilization using PMS data and various computer programs is also nearing completion.

Presently being considered is a data base that would utilize three Corps files from Project Historical, Physical Characteristics, and the National Waterways Study data files. Also under consideration is a data base that would access MarAd's port file (which is based on the Corps' Port Series Reports, MarAd studies, and various other sources).

The Civil Works Directorate of the Corps of Engineers is implementing a data base management and display system to provide an information and communication tool for assistance in the planning and monitoring of Corps programs and projects. This system, the Water Resources Data Center (WRDC), will be located at the Corps Headquarters facility at 20 Massachusetts Avenue, Washington, D.C. The National Aeronautics and Space Administration is providing technical assistance to the Corps on this project through an interagency agreement. A segment of the WRDC data base consists of navigation and waterborne commerce data. The Waterborne Commerce Statistics Program (WCSP) is the primary source of these data.

The WRDC will enhance the response capability of the existing WCSP in satisfying the information needs of the government and the private sector.

U.S. Coast Guard

The U. S. Coast Guard of the Department of Transportation has statistical responsibilities on certification and documentation of merchant marine vessels; certification of seaman; vessel casualties; pollution incidents; personnel injuries/deaths on commercial vessels; search and rescue incidents; and inspection and maintenance activities. For these purposes, the Coast Guard gathers extensive data which pertain to its functional responsibilities. Many of the data collected are incorporated in the publications, manuals, or systems listed below. The first three of these publications are described more fully in that they involve primary data acquisition systems.

Merchant Vessels of the U. S. Annual Directory: This annual publication lists the names of American merchant vessels and yachts that have uncancelled marine documents, registers, enrollments, or licenses as of January 1 of the current year, with their tonnages, dimensions, owners' names, and home ports. The Merchant Vessel Documentation System (MVD) described below is the data base for producing this Directory.

Merchant Vessel Documentation System (MVD): The MVD system input data are derived from merchant vessel documents, including ship registration, enrollment, and license, and yacht enrollment and license. Principal data elements are the official register number, vessel number, vessel name, vessel description, home port, and owner information. The data are maintained in both machine-readable form and in documentation files. The automated files are updated monthly, and made publicly available monthly. Annual hard copy reports are also produced.

List of Inspected Tank Barges and Tankships - Annual Report: This report lists tank ships and tank barges inspected and certified by the Coast Guard. The descriptive listings of individual vessels are as follows: (1) Tank barges and tankships, including name and number, gross tonnage, construction date and material, length, owner, operator, routes, capacity, highest certified cargo grade, certificate expiration date, and last drydock data; and (2) Hazardous materials barges, including number, cargoes listed on certificate, and temperature and pressure at which cargoes are carried.

Other Publications of Maritime Statistical Data by the U.S. Coast Guard are:

Coast Guard SAR (SEARCH AND RESCUE) Statistics, (Year) (Analysis, Forecast). (Annual Report)
Hazard Assessment Computer System (HACS) (Analysis)
Chemical Hazards Response Information System (CHRIS) (Analysis)
Statistics of Casualties. (Annual Report)
Vessel Casualty Data file (Analysis)
Marine Safety Information System (MSIS) (Analysis)
Polluting Incidents in and Around U. S. Waters (Annual Report)
Pollution Incidents Reporting System II (PIRS)
Standardized Aids to Navigation Data System
National Transportation Safety Board Annual Report to Congress (Analysis)

Future Coast Guard Plans Relative to Maritime Statistical Data: A recent draft study of the Coast Guard's Office of Operations and Office of the Comptroller notes that "recent developments in electronics, data processing, and communications make it apparent that the Coast Guard's communications needs, whether record or data, should be planned and procured in a logically consistent, if not integrated manner." The report defines certain areas of standardization, current and planned procurements, and systems overlaps which require further study. A modern communications network service has been procured to service the Operational Computer Center. A joint data and record communication terminal is planned to serve all Coast Guard terminal needs. A systems approach for implementing an integrated data and record communications network is provided.

Maritime Administration

The Maritime Administration, in accordance with the declaration of policy stated in Title I of the Merchant Marine Act, 1936, as amended, is reponsible for fostering the development and maintenance of a U. S. flag merchant marine sufficient to meet the needs of the domestic and foreign commerce of the United States. To carry out this responsibility the Maritime Administration conducts studies with respect to cargo movement patterns, U. S. foreign trade and domestic trade flow, and vessel utilization and employment. These studies require the availability of extensive cargo and ship data.

The computerized systems that are used to maintain this information in computer files are the Vessel Characteristics- Ship Data System (oceangoing commercial ships of 1,000 gross register tons and over), the Container Utilization System, the Maritime Administration Trade System and Domestic Waterborne Trade of the United States.

Vessel Characteristics - Ship Data System: There are basically two vessel characteristic data base files, namely the U. S. File and the Foreign File. A third file, the Merchant Fleets of the World, is generated by the system by combining the U. S. File and the Foreign File.

Input data for the U. S. File are extracted from information supplied by the U.S. Coast Guard, American Bureau of Shipping, Lloyd's Shipping Index, and individual operators' vessel position reports. Data extracted from the above mentioned sources are sorted out and redundant data are eliminated; then the data are recorded on Ship File Documents (Form MA-768) and used as input to update the U. S. File.

The input data for the Foreign File are purchased from the Shipping Information Service, a joint service provided by Lloyd's Register and Lloyd's of London Press. The two input files are known as the Register Book and New Construction.

An update Transaction File is created from the above mentioned files. Each transaction is reviewed and update errors, if any, are corrected. The corrected update Transaction File is used to update the Vessel Characteristics Master File, and a new Foreign File is created. Some frequently used data elements are Vessel Name and Code, Flag of Registry, Gross Register Tons, Deadweight Tons, Vessel Class Code, and Year Built.

Container Utilization System: Input data for this system are submitted by vessel operators on Container/Trailer Report - Foreign Trade (Form MA-578A Revised 12/77) for each inbound and outbound voyage carrying 25 or more containers/trailers units. The reports are logged in, edited, and batched. Data from the batched reports are entered via remote terminals, which provide interactive editing and coding.

Some frequently used data elements are Entrance/Clearance Code, Vessel Code, Flag of Registry, Operator, U. S. Port of Lading/Unlading, Foreign Port of Lading/Unlading, TEUs (twenty-foot equivalent units), and Weight (Long Tons).

Maritime Administration Trade System (MATS): The MATS data base is created by using Bureau of the Census data files. The two files used are the Vessel Movement File and Commodity Movement File. Vessel movement records are used to construct vessel voyages. Each inbound or outbound voyage is edited as to vessel, flag of registry, type service and operator (if in liner service). Commodity movement records are matched to each inbound and outbound voyage. Each inbound and outbound voyage is edited with reference to the additional information provided by the matched Commodity Movement records.

Some frequently used data elements are Entrance/Clearance Code, Vessel Name and Code, Type Service Code, Vessel Flag of Registry,

Operator, U. S. Port of Lading/ Unlading, Foreign Port of Lading/Unlading, Country of Origin/Destination, Commodity Code, Weight (long tons and pounds), and Dollar Value.

Containerized Cargo Data: Containerized Cargo Statistics is one publication wherein MarAd obtains its data directly and is published annually. The contents of this report are described below.

The 1976 edition of this report contains statistics for the 1974 calendar year. Statistics for calendar years 1975, 1976, and 1977 were published during the 1979 calendar year while the 1978 edition was published during calendar year 1980. The report is used by both industry and government groups interested in the waterborne foreign commerce of the United States. It contains summaries of containerized cargo statistics for each MarAd-designated U. S. foreign trade route. The 1970-1977 data were obtained from operator-filed Supplemental Unitized Cargo Container Reports, Form MA-578A that were filed with the appropriate District Director of Customs upon each initial entrance and final clearance of a vessel carrying 10 or more 8x8x20 foot cargo containers/trailer units at a U.S. port. In addition to the filings of all commercial merchant vessels, forms are filed for all voyages of merchant vessels operated by or for the Department of Defense, except vessels of the Military Sealift Command nucleus fleet. Specific data breakdowns include: containerized cargo by U. S. coastal districts, selected U.S. Ports (number of containers, total tonnage, and percent increase over previous year); top twenty foreign countries, top twenty foreign ports; containerized cargo on selected trade routes; and comparison of the containerized cargo on each trade route, for current year and previous year.

Beginning with calendar year 1978 containerized cargo information is obtained from the revised MA-578A Form Containerized/Trailer Report-Foreign Trade upon each initial entrance and final clearance of a vessel carrying 25 or more 8x8x20 foot cargo container/trailer units. This revised form eliminated the report of number of containers and cargo cubic feet, while instituting loaded TEUs (twenty-foot equivalent units) and empty TEUs. Specific data breakdowns included in the calendar year 1978 editions are: containerized cargo by U.S.-flag vessels and individual foreign-flag fleet percentages; containerized cargo by U.S. coastal districts, top U.S. ports, top thirty foreign countries and top fifty foreign ports; and comparison of containerized tons for current year to previous year for each individual U.S./foreign trade route.

Domestic Waterborne Trade of the United States: The statistics used in this annual report of the five most recent years of data availability are provided by the Corps of Engineers. Intercity freight by mode statistics are provided by the Transportation Association of America. The report provides individual year and five year data by area, commodity and type of vessel in a very comprehensive manner. It aggregates Shipping Ports and Receiving Ports statistics and also aggregates by commodity. Convenient Area Profiles are also presented.

Other Publications of Maritime Statistical Data by MarAd are:

U. S. Ports Foreign Trade-Jaunary-December (Year). Annual Report
A Statistical Analysis of the World's Merchant Fleets: Showing Age, Size, Speed, and Draft by Frequency Grouping as of December 31, (Year). Annual Report
Inventory of American Intermodal Equipment (Year). Annual Report
International Shipborne Barge Register. Quarterly Report
Foreign Flag Merchant Ships Owned by U. S. Parent Companies. Annual Report
Ship Data System (SDS).
Vessel Inventory Report. Semi-Annual Report
Bulk Carriers in the World Fleet: Oceangoing Merchant Type Ships, of 1,000 Gross Tons and Over, Excluding Great Lakes as of December (year). Annual Report
Maritime Data Network.
Listing of Barges Specially Designed to be Carried Aboard Another Vessel. Annual Report
Vessel Movement System (VMS).
Losses and Scrappings. Annual Report
U. S. Exports Transshipped Via Canadian Ports.
Domestic Trade System.
Cargo Preference System (CPS).
Cargo/Operator Shipping Information System (COSIS).
Foreign Trade System. (Analysis)
Domestic Waterborne Trade of the U. S., 1973-1977. (Analysis)
Mid-America Ports Study. (Analysis)
Shipbuilding Progress Report. Monthly Report
Maintenance and Repair (M&R).
Report on Survey of U. S. Shipbuilding and Repair Facilities (Analysis, Forecast). Annual Report.
Effect of Federal Standards on U. S. Public Port Development. (Analysis)
North American Port Development Expenditures Survey.
The Maritime Aids of the Six Major Maritime Nations. (Analysis)
Relative Cost of Shipbuilding in the Various Coastal Districts of the United States. Report to the Congress. Annual Report
New Ship Construction. Oceangoing Merchant Type Ships of 1000 GT and Over. Annual Report
Foreign Manning Information System (FMI).
Seamen's Analysis (SEA).
Deck and Engine Officers in the U. S. Merchant Marine Supply and Demand, 1976-1985. (Analysis, Forecast) Bi-Annual Report
Civilian Seafaring Manpower Requirements in Peace and War, 1978-1984. (Analysis, Forecast)
Maritime Contract Impact System (MCIS).
Merchant Marine Data Sheet. Monthly Report
U. S. Oceanborne Foreign Trade Routes. (Analysis) Annual report
Domestic Waterborne Trade of the U. S., 1973-1977. (Analysis)

A more recent publication released by the Maritime Administration is U. S. Imports Via Minibridge, July 1979. "The purpose of this report is to set forth a quantitative data base on minibridge import traffic." The report notes that the present statistical methods employed by the Bureau of the Census are not conducive to a report on minibridge export traffic. The type of shipments reflected in this report are "regular U. S. import statistics (as differentiated from the U. S. import waterborne statistics) in terms of commodity, country of origin, Customs district of entry (where the import entry was filed) and Customs district of unloading. These data are tabulated by the U. S. Bureau of the Census on monthly IM245 and annual IA245 data Trips-in Bond Imports." The "report includes only the waterborne imports which reflect a difference between the port of unloading and the port of entry . . ."

Current Plans for Improvement of MarAd Systems: A new system has been developed to replace the Container Utilization System. The two main advantages of the new system are, first, the new system provides an option of data entry via the PDP-11 minicomputer or the Honeywell 6000 computer, making available more data entry time; second, the new system accommodates the data collected on the revised Form MA-578A.

The Vessel Characteristics-Ship Data System is being revised to consolidate several editing and reviewing steps in logical groupings for more efficient review and corrections.

The Maritime Administration Trade System will be continuously modified in the next two or three years. The goal is to automate tedious and time-consuming manual tasks in order to compress the total processing time.

U.S. Customs Service

Basic Mission: All United States imports and exports have to pass through the U. S. Customs Service (Customs) for paying duties and, therefore, shippers and consignees have to fill in Customs manifests giving details by ports of loading/unloading, commodities, tonnage, measurement, etc. As described in the beginning of this chapter, the maritime data collected by Customs is processed by the Bureau of the Census.

Customs also collects data pertaining to vessel arrivals (Form CF 16-C) and departures (Form CF 16-D) for vessels carrying cargo and those carrying passengers; this Transportation Report, Form CF 16-C on vessel arrivals, essentially includes data on whether the vessel is commercial, military, etc., carrying cargo, and the total number of bills of lading originally manifested for discharge at a port. Individual bills, not master bills, are reported.

In addition, Customs publishes an Annual Report which includes cargo data by region and Customs district and by category of carriers and numbers of persons entering the U. S. by region and mode of transportation; it includes cargo seizures by mode of transport and port of attempted entry.

Plans for Automated Manifest Inventory Control (Vessel): Customs has concluded that current manual procedures for manifest control and clearance are time-consuming and inefficient. As Customs moves more and more toward selective cargo processing, based on high-risk screening and post audits of commercial records, timely and efficient manifest control and clearance are recognized as essential to the success of these techniques, while maintaining compatiblity with current transportation industry practices and information processing and transmission capabilities to the greatest extent possible.

Today Customs is adjusting its operating controls and procedures to adapt to the revolution in transportation and communications technology. Customs control capabilities are being enhanced and strengthened while simultaneously the flow of legitimate imported cargo is being facilitated to the greatest extent possible. This is being done in the context of continually increasing workload volumes and frequent shifts in the volume, mode, frequency, and intensity of cargo flow. It also is being done in the face of static or actually decreasing inspection manpower.

The approach being taken is the use of automation to simplify record keeping for control and monitoring purposes to reduce the clerical burden on inspection resources. This is being done to make as much manpower available for inspection functions as possible and to supply the necessary information tools to permit the intelligent and selective application of those resources to high risk and high potential areas of inspection. This represents a radical realignment of Customs procedures, and is postulated on the ability to interface with existing and planned commercial cargo control systems.

One such existing commercial cargo control system is that of the American President Lines (APL). Customs has worked closely with this major ocean carrier for several years during the development, testing, and implementation of the consolidation information processing and transmission procedure. This procedure is based on the ability of APL's cargo control system to produce an extract of the inward foreign manifest with the additional data elements required for an inbound movement. Recently, Customs began a test of electronic transmission and posting of air manifests in Los Angeles, using its own hardware and software. Customs realized that it would be quite some time before it would be able to expand this capability to ocean carriers. In order to gain experience with automated inventory control in an ocean carrier environment, Customs accepted APL's offer to test this capability utilizing their system and equipment. The test began on July 23, 1980 at APL's Oakland facility.

Future Expansion of Customs Operations: In the fall of 1980, computer terminals for Customs use were operational at APL's Los Angeles (San Pedro) and Seattle facilities. The system has been evaluated over a 6 month period at these ports. Based upon a successful evaluation and other considerations, the system may be installed at other high-volume APL ports of call.

In addition, plans are now being made with Sea-Land to implement a similar system at one or more high-volume ports. Besides Sea-Land,

Matson has agreed to build this Customs capability into their internal systems as well.

In order to standardize this capability, Customs has developed a set of functional requirements which will be used by carriers wishing to participate in this program. While internal system processing varies from carrier to carrier, these functional requirements are designed to insure that the Customs portion of these various internals are the same.

APL has informed Customs that Japan Customs will also implement this system at Japanese seaports, once U. S. Customs certifies it as acceptable after testing is completed.

Coordinated Federal Publication Activities

In the mid 1970s, four federal agencies, the Bureau of the Census, Department of Transportation, Corps of Engineers, and Maritime Administration, sponsored a special survey of foreign trade. The two-volume report is entitled Domestic and International Transportation of U.S. Foreign Trade: 1976 (Part A Exports, Part B Imports). It contains results of the 1976 Survey of Domestic and International Transportation of U. S. Foreign Trade, an origin/destination study of the movement of foreign trade within the United States. The results are also available on a public-use magnetic tape.

The purpose of this survey was to collect data for 1976 similar to, but more comprehensive than, those collected during the 1970 survey (and an earlier 1956 survey) on movement of exports and imports within the United States. The information collected includes the interior origin state of exports and destination of imports; the domestic mode of transportation between significant points; the commodity weight, value, and volume; the international and domestic shipping costs; the use of containerization and other handling characteristics; and terms of sale (c.i.f., etc.). The new data were linked to data already available on the international movement of commodities through ports within the 48 contiguous states as collected from documents filed with the U. S. Customs Service. This information will be useful to shippers, carriers, port authorities researchers, and government agencies at all levels in areas such as cargo forecasting, market analysis, and facilities planning. The scope of the 1976 survey was expanded over the 1970 survey to include previously excluded bulk commodities and to collect information on U.S. foreign trade commodities transshipped to and from third countries by train and truck via Canada and Mexico.

This 1976 survey and the motivation for its creation is closely linked to the statistical data user community requests, described in detail in Chapter 4 following. It is worth noting that, notwithstanding the careful documentation accompanying the 1976 survey, that users of the report have questioned its utility for some purposes. The chief problem, as described by R. L. Heilmann in Statistically Based Research on Issues Related to Foreign Trade: The Experience of a Researcher in the Hinterlands, report of the Management Research Center, School of

Business Administration, University of Wisconsin at Milwaukee, April 30,1980, is that the survey sampling methods used can result in up to a 25 percent relative standard error when the data are used at a micro-level to look at local or small regional cargo movements. Dr. Heilmann has advised that the micro-level data available on the public use magnetic tape of this report be used "with full knowledge of the needs of the application and the limitations of the data." He further has suggested that any future reports issued by Census containing micro-level data be accompanied by documentation describing not only how the data were gathered but also to give examples of some appropriate and some inappropriate uses of that data. Furthermore, he has suggested that if Census wants to document trade to a local or regional level of detail, that it design its sampling procedures so that an adequate proportion of the total population is sampled so as to permit valid analysis at that level of detail.

Regulatory Bodies and Ship Classification Societies

The U. S. Coast Guard: Every vessel engaged in foreign or domestic commerce is required by various laws and treaties (which are also national law) to be constructed in a manner consistent with those laws. Adherance leads to the issuance of certain documents without which the vessel cannot operate. The Coast Guard is the instrumentality of the U. S. Government charged with ensuring that the laws and treaties are adhered to before such vessel documents are issued and a vessel may fly the U.S. flag.

All of the responsiblities on behalf of the U. S. Government are assigned to the Coast Guard which in turn is empowered to and has delegated certain of these functions to classification societies, the principal of which is the American Bureau of Shipping. The Coast Guard has also delegated functions to other organizations in the marine field such as the National Cargo Bureau and the International Cargo Gear Bureau. However, the responsiblity of the government is vested in the Coast Guard and delegation to these other agencies does not remove the basic responsibility.

Classification Societies: The classification societies have a large influence on the construction of vessels whether registered in the U. S. or other nations. Classification societies establish and administer standards, called Rules, for the design, construction,and periodic survey of ships and other marine structures. Classification provides evidence to underwriters, governmental bodies, charterers, financial institutions, and other interested parties that an owner has exercised due diligence in making his vessel structurally and mechanically fit for its intended service. As such, and since the major societies are recognized as impartial and authoritative, virtually all sizeable vessels are classed.

In fulfilling their responsiblities, these classification societies acquire data on ships, process these data, and publish the results in various forms. Two of the major ones, Lloyd's Register of Shipping and

the American Bureau of Shipping, maintain data on all ships of the world over 500 gross register tons on their own in-house computers and produce annual registers and monthly update supplements on changes. The registers provide considerable detail on ship characteristics, which are collected primarily from the ship owner; there are "supplemental" or specialized registers that are available on tankers, bulk carriers, and ro/ro ships.

Data Acquisition, Processing, and Dissemination on International Vessel Movements

The primary supplier of international vessel movement statistics is Lloyd's of London Press, Ltd., Colchester, England. Although the data are collected mainly for Lloyd's use, non-confidential data are made available on a commercial basis. More than 1200 Lloyd's agents, located in ports around the world, transmit ship arrival and departure data to the Lloyd's office by various means, i.e., telex or letter. The information is entered into a PDP-11 mini-computer with its data being reported daily through numerous video terminals.

The system provides a daily and weekly magnetic tape to facilitate automatic type setting for the printing of the daily Shipping Index, a publication showing the port calls of over 30,000 vessels. Also produced is a weekly document called the Voyage Summary which gives the port itinerary of port calls for each vessel.

A service is also offered producing special reports for clients requesting specific types of data and information. Magnetic tapes are available to organizations, including government agencies, who have their own in-house computer programs to process the data. In addition, Lloyd's will be providing such data through an on-line network via their affiliate company, the Maritime Data Network, whereby subscribers can request various types of printed reports through a computer terminal in their office.

The Journal of Commerce Import and Export Tabulation

The Journal of Commerce publishes a weekly import and export bulletin. Data for this are collected by their representatives from shipping manifests filed by each ship at U.S. Customs when the ship calls at a U. S. port. The import and export manifest information used for these publications is now available from the Journal of Commerce by computer. A "new on-line system allows access to its data base of export/import movements from remote terminals anywhere in the world" (Trade Information Service).

The manifest information for imports (ISIS) and exports (EXIT) is available two ways.

- Basic Fixed Format Reports: These are batch reports for subscribers desiring ongoing weekly or monthly tabulations covering a fixed set of specifications.

- On-Line Service: The import and export data are maintained on an on-line Tandem computer and subscribers may access the Tandem from their own in-house computer terminals through their local telephone system. Individual programs for each subscriber automatically tabulate the specific cargoes of interest, in whatever sequence required, on a weekly or monthly basis. Output is hard copy from the computer printer or microfiche.

Fields of data made available include commodity, U. S. port and foreign port (of loading and unloading), foreign country, state where U. S. consignee or exporter is located, consignee/exporter name in alpha order, and ship line.

CHAPTER 4

CARGO CHARACTERISTICS AND MOVEMENTS

This chapter addresses the needs of the industry for information relating to cargo characteristics and movements. To understand these needs, the uses of the information are also described. Containerized cargo is emphasized because of its interest to the industry and the special problems presented by container and intermodal movements.

The substantive aspects of the information are dealt with, namely scope, content, and scheduling of the data needed. Issues pertaining to data management, such as form, coding, accuracy, sources, and processing are covered in Chapter 7. The contents of the chapter are based mainly on the observations of the Committee and of regional meeting attendees.

Use of Information

Long Range Planning: Cargo flow information is essential to many levels and types of planning. For example, forecasting the need for ships in a national sense, by the Maritime Administration, or in a more parochial sense, by the nation's shipbuilders, requires some anticipation of the quantity of cargo flows and their nature. Similarly, port directors must set their policies and tailor facilities to the probable cargo flows of the future. Managers of waterways (e.g., the Corps of Engineers) have a similar problem, especially since the justification for expenditures on waterway improvements requires intense examination of benefit/cost projections. Railroads are faced with a continual and major problem of projecting future service in the long range. The national and local needs for containers and flatcars demand a knowledge of what cargoes will flow.

Regional facility planning, such as that undertaken for the multi-state regions of the major coastal bays, ports, and inland rivers, as well as state and national planning, requires some projection of cargo flow information. Especially important are emergency response plans associated with monitoring the flow of hazardous or potentially contaminating cargoes. Among the requirements of many of these plans, there is the need to identify the associated personnel requirements as well as the balance of the needs for various facility users.

For the aforementioned planning purposes, it is necessary to project the cargo flow by weight, volume and value, to have some knowledge of the commodities that will flow, and to know whether cargoes will be hazardous, contraband, perishable, or will have special handling needs in terms of fragility or weight. Also, for port, regional, waterway, railroad, and truck planning, it is necessary to have some idea of commodity values. These values are needed to estimate the revenues that can be expected from various investment alternatives.

Cargo routings have changed with the markets and with the availability of major new shipping systems such as trailer-trains and containers. Containers, however, have introduced a special problem because of their intermodal use. Resultant systems such as the land-bridge, mini-bridge, and air-sea links generate a wide variety of alternatives for shipping in which inland waterway and ocean shipping compete with overland alternatives such as trucks, trains, and even over-ocean aircraft. Shippers are concerned because they seek to compare routings to achieve either the least expensive, most prompt, most frequent, or most flexible routing for their shipments, or some combination compromise thereof.

Port directors are concerned with increased inter-modality of cargoes because they desire to maximize their share of the cargo flow relative to their investment in capital facilities. Ports, generally operated by public authorities, are also interested in direct and indirect employment opportunities associated with the transportation industries. Waterway carriers, trucks, and railroads, seeking to maximize productive utilization of their equipment, are concerned about their involvement in the flow that can be anticipated from these new types of cargo systems. To this end, providers of transportation services or facilities find it necessary to have good information on the probable flows of cargo by weight, volume, and value. Furthermore, some knowledge of the movements of the relatively small quantities of special and/or hazardous commodities is required to ascertain that their routes are acceptable and compatible with available risk-avoidance systems.

Market Projection: Sales are the driving incentive of the entire transportation system. Ship and barge lines vie with railroads and truckers for cargoes, and ports vie with one another to try to increase throughput. Good information on cargo flow is required in order to exploit potential commercial opportunities. This information often must include cargo values in order to make benefit judgements. In addition, the information needed includes identification of the shipper and perhaps the consignee. This information is essential for sales management. A further feature of the sales area is the possibility of providing new services that will "scoop" the competition.

Both shipping conferences and ports are engaged in a special facet of marketing. They are intent upon protecting their share of the business, and have a defensive eye on potentially injurious changes to the status quo. Finally, market-type information on cargo flow is also required by the Federal Maritime Commission as a basis for its rate approval activities.

Other Uses of Information: Statistics on cargo flow are aggregated in a national sense for a variety of public purposes. These include: monitoring the balance of trade, energy imports, U.S.-only shipment quotas, and the magnitude and nature of import duties.

Many cargo shipments contain special commodities. These may be hazardous, they may be contraband, they may be perishable or they may require special handling because of their size, fragility, or weight. The advent of the container has created special inspection problems for the Customs Service, the Department of Agriculture, and the U.S. Coast Guard, since it is not always apparent what is being carried in the container. Thus, special informational needs exist because the containers must be prominently labeled, and the accompanying documents must be properly flagged so that gvovernment agencies, ports, and carriers can know in advance what they face when a container is placed in their custody.

It is a practical fact that the documentation being used does not also make it clear what is in arriving box cars, containers, or trucks. Frequently, the cargoes arrive at a port with their makeup unknown. This is one of the important documentation problems that might be solved as a part of an overall information management improvement which could enhance the data base.

More and more general cargo is being carried in containers. The flow of containers on flatcars throughout the United States is increasing. Much of this flow consists of seagoing containers involved in inland-bridge, micro-bridge and mini-bridge operations. This increase calls for better information, especially regarding associated railroad and trucking support.

Another need for cargo information is for regulatory review and analysis. Many current regulations and procedures of the federal regulatory agencies are geared to non-containerized and non-intermodal freight. Thus, options available to a vessel operator at a discharge port are often not available at the destination port after interport intermodal movement. Likewise, many regulatory requirements go into effect at the time of cargo discharge. These can lead to costly and time-consuming intermediate handling of containerized cargo, thereby defeating the purpose of containerization. Accurate cargo movement, flow, or pattern information is essential if regulatory and procedural requirements are to be adjusted in the light of current industry capabilities and practices.

Information Needed

Ocean shipping covers a wide spectrum of constituencies for ocean and overland carriage, each with its own tailor-made needs for cargo shipment information. Attempting to catalog the needs of each group would generate an endless jumble of requirements. To avoid this, all of the data-related needs expressed at the Maritime Information Committee regional meetings have been compiled in a collective framework.

This accumulation of "needs" applies to all shipments; be they by sea or land, within the U.S. or abroad; regardless of whether they are imports, exports, or domestic shipments; and for all types of stowage, i.e., break-bulk, containerized, dry bulk, or liquid bulk.

Essentially, the collective shipping community wants to have a "complete suite of linked data elements" for each shipment including: commodities, packaging, timing, weight, volume, and value, as well as modes of handling, transferring, and, of course, shipping. It should include the entire set of transportation modes utilized between the true origin (TO) and ultimate destination (UD). The shipping community also wants to know who made the shipping decisions - the identification of all managers of the shipment including the originator or shipper, the forwarder, the agents, the carriers, and the consignees.

The information needs presented below do not consider whether or not the data currently exist in a data base. Some of the information needs can be satisfied only by the collection of new data because the data are not included in present information.

Commodity Identification: Almost every part of the shipping community wants to know the description of the commodities in the shipment.

Containerization and Packaging: Packaging for the ocean voyage is important. The cargo may be gaseous, liquid, slurry, or dry bulk which requires no packaging because it can be carried in the ship's hold; or perhaps it may be logs which can be rafted and do not even require a ship. Looking to general cargo, however, there is the question of what packages are being carried within what packages. The outer package is the ship itself. Within it there may be barges, containers, or other types of packaging such as superpallet, pallet, crate, barrel, drum, sack, carton, or parcel. A five or six layer package shipment is reasonable, e.g., parcel, carton, crate, container, barge, and ship.

Industry expresses a need to know this packaging information to its finest detail. In contrast, prevailing data collection mechanisms often do not include information as to whether the cargo is containerized, trailered, or in break-bulk form. Moreover, in many instances where containerization may be indicated, the size of the container is not shown or is it known whether the container is really a trailer.

Shipment Documentation: Collectively the secondary users want to know all about each shipment. Beside the weight and commodity data they also want to know the cargo value, the number of containers and size, the shipboard volume required for the shipment, and special handling needs.

If it is inbound cargo, the equipment lessees, as well as railroads and truckers, receive insufficient data regarding the character of the cargo to be moved; port authorities and terminal operators often have no idea of what must be handled, for instance whether roll on-roll off facilities are needed. For outbound movements, inland bills of lading often fail to state that the shipment is intermodal. Moreover, package

lists, i.e., bills of lading, are inadequate if repackaging occurs. If the cargo is loaded or unloaded inland, the origin and destination data are frequently lost for record purposes.

The lack of complete information from inland waterway, railroad, and truck carriers creates a problem in statistical analysis of shipment data. There is also the operational problem that the lack of documentation and labeling denies the cargo the required security of proper stowage, shoring, and dunnage to meet the rigors of ocean voyages. For instance, inland-river shipments of machinery, not designated as intermodal shipments, have subsequently gone to sea; and lack of proper shoring within the containers has resulted in damage to the cargo.

Itinerary: Probably the most frequent demand is for an identification of the true origin and ultimate destination (TO/UD) of all shipments and especially of imports and exports. Lack of this information is a significant problem for nearly all segments of the industry because it degrades planning of trade routes, inland and intermodal transportation links, equipment acquisition, ports, and facilities. The lack also hinders marketing and sales efforts.

The shipping community also seeks to know the entire itinerary, beginning with the originator or source, through the container loading point, through the ship loading port, a record of intermediate ports, identification of customs clearance points, ports of foreign departure or arrival, the ship unloading port, and the final destination, i.e., the residence of the consignee. For each pause in the itinerary, the time and data of arrival and departure is sought, as well as the port, and in some cases even the berth of the ship.

There is some misrepresentation and many inconsistencies in routing information, especially with respect to cargoes which are routed through Canada. It is desirable to know which cargoes are being traded with partners in Canada and, alternatively, which are "Canadian diversion" cargoes, being shipped through Canada as the most economical route; the latter route competes with U.S. domestic overland services and ports. (The 1976-78 Ports Data Conference addressed this problem and the Maritime Administration is preparing reports based on Bureau of the Census data.)

In many cases for import cargoes or domestic cargoes, the destination is obscured by a generality. For example, a cargo might be documented for a firm's headquarters office, but that cargo might be shipped directly to the firm's plant or store almost anywhere in the United States.

A fairly large amount of the required type of information has been collected but on an irregular and not always consistent basis by the Bureau of the Census. Railroad traffic management has some of the desired data but similar data are not always available from truckers. Railroad and truck waybills should show the cargo onboard, but often these waybills are not available or cannot be related to a waterborne movement. The Bureau of the Census has discharge port and destination data from Customs entries for imports, but it covers only inbound

shipments; thus, it is not a complete representation of import shipments.

Not all of the problems can be solved by documentation and processing. Some of the problems stem from the manner in which the shipping business is conducted. Some domestic cargo is shipped to another domestic point before the shipper has determined whether it is to be exported. If a cargo was shipped before it was known to be an export, the true origin would not and could not appear in the present system, and the destination could not be known until after the fact and outside of the information system. This is more than an institutional problem because the only known destination on a shipment may be a warehouse from which further movements will be made.

If such a cargo is a bulk commodity (grains, etc.) mixed with other domestic shipments at the storage point, the true origin of the export may never be identifiable.

Marine Carriers; Ships, Towboats, and Barges: Another problem is that documents for the ocean legs of a shipment do not indicate which ship will move the cargo and, in the reverse, although the ship's port of call may be available data, current data systems do not identify what cargo was on board at the time of a ship movement. Other problems include vessel identification symbols and vessel-type information.

The identification of the ship is considered a must, especially by an internationally recognized identification symbol. This would facilitate entry into ship data bases where additional information including the type of ship, name, size, capacity, operator, and owner can be determined, as well as other particulars now on file with Lloyds and the American Bureau of Shipping.

Where barges or containers are involved, an identification and description is needed. The type of barge or container, its identification symbol, size, manufacturer, owner, lessor, and lessee should be in the record. One key problem is that the identification of vessels, barges, and containers is often considered to be proprietary information.

Overland Carriers; Railroads and Trucks: Overland carrier identification is needed both domestically and on foreign shores. It is considered important to know the waterway carrier, the trucker, the railroad, or the airline which carried the shipment from the source to the port, from port to port, and from port to ultimate destination.

The availability of adequate truck-route information would greatly improve the ability to do route planning. Operationally, better documentation would reduce the number of occasions on which there is equipment incompatibility. In some cases, tractors arriving for pick-up are unable to move trailers because the hitches do not match. In other cases, lifting equipment is not able to handle the loads. Information on the trucks and equipment often does not indicate such things as whether they are refrigerated or ventilated, their size, the quantities of trucks available, and so on. Trucking firms generally have been unable or reluctant to supply these data.

No solutions have been suggested for this problem, but if an improvement is to be made, there must be some motivation to encourage major trucking firms to cooperate in maritime-information planning activities. Information regarding rail transport is more readily available than for trucking. Even so, the data are incomplete and users would benefit if the data gaps were filled.

Container Movements and Inventory: It would be desirable to optimize the utilization of containers. The most effective action results from limiting the amount of deadheading, i.e., transits of empty containers. If container movement data were obtained for this purpose, it could be used to maintain a dynamic inventory and provide the carriers with a full identification of the container, its builder, owner, lessee, content, and damage status. One big problem is damage data on containers.

One potential solution is a container-movement data clearinghouse. There is an indication that railroad and steamship lines would cooperate and this would help reduce the cost of keeping track of containers. Also, it would permit recording damage to containers and establishing the true billing point for repair or replacement.

The interchange of containers is constrained by company pride, by competitive needs, and to a lesser extent by government restrictions on foreign-built containers in the U.S. The availability of a clearinghouse might reduce the constraints placed by these factors and make it possible to economize even further on the use of existing containers.

The container status statistics assembled and published by MarAd, deal only with trade routes and do not include commodity information. They are not of much help in tracking paths of specific containerized cargoes, and may be incomplete because of the collection procedure.

Other sources of containerization data are steamship lines, shipping conferences, and port authorities. Railroads, truckers, and the Interstate Commerce Commission are lesser sources of container movement information for overseas shipment. Perhaps more consistent liaison between these various activities could result in more reliable output of data on containerized movements.

The most logical solution to the foregoing problem of container movements is the establishment of a continuous record of the complete shipment including intermodal waybills. This has been done through the Transportation Internationale Rapid (TIR) of the European Common Market, and there seems to be no firm reason why the system could not be extended to the United States. The U.S. is a party to the TIR Convention and its use is already permitted by federal regulation.

Special Cargo Features: The special features of oceangoing commodities that are desired include: the hazardous feature, e.g., whether it is noxious, tainting, radioactive, toxic, or potentially explosive, especially as it may affect other common carriers that do not always know precisely what they are being asked to carry. Also, it is desired to know if it is a prohibited commodity such as a potential contaminant or contraband. Is the commodity perishable, or easily

tainted, thus requiring prompt delivery or refrigeration? What are the special handling needs? Is it fragile, outsize, or does it require a heavy lift? The need for this type of information is most important when an interchange occurs between two carriers or between a carrier and a terminal. The increasing use of container shipping has made it easier to obscure the special characteristics of cargo.

The problem extends beyond cargo security and statistics. Identification of commodities is inadequate in both labeling and in documentation. This is especially burdensome in the case of containerized cargoes. The problem is that the shipment may or may not include potentially contaminating cargoes which are of interest to the Department of Agriculture, hazardous cargoes of interest to the U.S. Coast Guard, contraband of interest to the Customs Service, or even legitimate cargoes upon which tariffs should be assessed. In many cases, ship manifests on inbound cargoes do not contain particular codes to identify those cargoes which have problem agricultural content or hazardous materials. It is difficult and costly to perform a physical inspection of containers enroute. The major problem is verification but, additionally, there are known to be willful violations; these could, in the case of hazardous or contaminated cargo, endanger the populace.

This problem, however, does not end with containerized cargo. In many cases, it has been found that the dunnage and packaging were in themselves the carriers of contaminating vermin or substances. Spot checks are required in spite of the most comprehensive documentation. Solving these problems requires a complete record of the route, intermediate storage points, packaging materials, and materials brought aboard for dunnage or shoring.

The special problem of hazardous cargoes is of chronic concern. Containerization has made it easier to obscure the presence of dangerous commodities, and it appears that a great deal of hazardous cargo is transiting terminals and moving on ships without adequate labeling and advance notification through proper documentation.

It is not enough to know about individual shipments; it is necessary to have some knowledge of the typical flow of different hazardous cargoes by quantity and type, and the mode of shipment and transfer. Localities on the routings of such cargoes, the ports, and the ocean carriers, must know how much is being carried and what their vulnerability is; otherwise it is impossible for them to estimate the probabilities of impacting accidents, prepare emergency response and evacuation plans, and marshall the equipment to respond to an emergency. Of all the states, only the Commonwealth of Virginia has been surveying the flow of hazardous cargoes.

It appears that there can be no compromise in the solution of this problem pertaining to hazardous cargo. It must be solved directly by whatever means required, be they legislative or regulatory. It is also apparent that the industry must move promptly to label all hazardous cargoes and be able to assure that accompanying and advance documents adequately indicate the nature of the cargoes. The industry and its regulatory bodies must install the means to determine, on a

regular basis, the quanitities and flow patterns of hazardous materials into, out of, and throughout the United States.

The urgency and importance of operational and planning needs for hazardous cargo information can be expected to generate the required data and data bases in the near future.

Unrecorded Information

Much of the information desired by various constituencies is not contained in present information systems. There are many complete shipments that are not recorded. These omitted records include domestic bulk cargoes moving in the shipper's own vessels if they do not pass a waterway lock or other recording station. Similarly, substantial movements of any cargo on the rivers between the locks are not recorded. The movement of unit trains, in a land-bridge operation, are also not clearly identifiable in current data. For example, over 50 percent of the vessel-container cargo arriving in the Port of Seattle moves, in bond, to other ports. Most of this traffic moves by land bridge. This leads to underestimates of necessary local infra-structure and support services to provide for the movements. These movements require equipment, but they do not become a part of the public record and do not appear in any of the aggregated data. The spotty inclusion of local domestic and feeder service cargo movements in aggregated data causes significant understatement of the transportation effort required for total cargo movement.

Containerization with its obvious benefits has produced some difficulties. It has caused gaps in commodity records because the system does not require revelation of all information. Corporate secrecy encourages omission of commodity types and use of the freight-all-kinds (FAK) label in lieu of a commodity content inventory. Even for imports that must be identified to Customs, the data are not available for public use. Other types of information are also absent from the records. For instance, there is no indication as to whether a shipment is preference cargo, i.e., one falling into one of the categories designated as requiring a U.S. flag bottom.

Ports, regions, and states want to know about the volumes and values of cargo flow for a variety of purposes. But, the aggregate local data are not complete and to some extent not available. Part of the problem stems from the fact that the information on local movements is collected by the Corps of Engineers in a different manner than information obtained on export and import movements by Customs.

Choosing Information to Add

The aforementioned items are the more obvious ones which are thought to be <u>needed</u>. Each of the many constituencies has its own idea of how these data should be compiled statistically, and of the degree of aggregation, the frequency of compilation, refinement, and detail. The schedule of reports will also be different for each need. However,

if all of the aforementioned information regarding each shipment were put in a data bank, practically all of the information needs could be met with adequate programming and present day automated data handling equipment.

Many of the needs expressed by the constituencies are not, at this time, being met. Of course, the importance of these needs and the urgency of meeting them is in the eyes of each consistuency. The problem is not a simple one. It is not just the technical problem of meeting the needs, but it entails the more difficult questions of who is the beneficiary and who should pay the bill.

All this need to know must be balanced against the cost of acquiring the information in a usable form. This "balancing" of need versus cost will be different for every member of the shipping community. This subject is amplified in Chapter 8 - Findings, Conclusions, and Recommendations.

CHAPTER 5

VESSEL CHARACTERISTICS AND MOVEMENTS

Introduction

From the several regional meetings of the Maritime Information Committee it has become apparent that the major interest in maritime statistical data from the commercial side is the movement of cargo. This is not surprising, since the primary purpose of marine transportation is cargo movement. It has been noted in Chapter 4 that the form and ultimate use of the information on cargo movement may vary somewhat depending on who the user of the information may be, i.e., port authority, shipper, carrier, government, etc., but the basic elements of required data appear to be fairly common.

In addition to data pertaining to the cargo, it is often necessary to have information on the characteristics of ships in order to determine or deduce certain information about the cargo movement. As an example, a particular cargo movement may not be classified on the bill of lading as to its form, but the fact that it was shipped on a vessel identified as a fully containerized vessel, identifies the movement as containerized.

Other information is often necessary concerning vessel characteristics such as cargo capacities, cargo gear, and dimensions which may be used for port planning purposes with regard to cargo movement capabilities. Reports of deadweight and displacement would be of greater value than gross and net tonnages.

The amount of detail required of vessel characteristics data may vary according to the intended use. Certain users may be content with overall grouped statistics on vessels, concerning average cargo movements, where others who are interested in a specific vessel, perhaps to charter it, are interested in far more detailed information.

Besides the characteristics of vessels, the interest in vessel movements is similarly oriented primarily to cargo movements. This again may represent requirements for the vessel movement data in various forms, from determining total vessel movements between ports to tracking the movement of a particular vessel within the port. Often there are some specifical requirements to meet particular conditions existing at anytime, such as the tracking of crude oil tankers during periods of oil shortages or emergencies.

There are, of course, a number of organizations that can use information concerning both vessel characteristics and movements for various purposes, including marketing to the maritime industry itself.

Secondary users of information regarding the characteristics and movements of oceangoing vessels may be thought of in four groups:

(1) those companies requiring transportation (the shippers),
(2) those organizations supplying transportation (shipping organizations),
(3) those supplying services to the vessel owners and operators (shipyards, equipment manufacturers, and container suppliers), and
(4) port authorities or other agencies charged with the control of vessel movements within port and harbor areas.

Within each of these areas are those involved with operations, sales, and services.

Although the data elements that may be needed by each of these groups are essentially the same, the form and aggregation of the information, as well as the timeliness, may be quite different. This, therefore, puts limitations on the utility of statistical data in hard copy, non-manipulable form. Although classification societies and government agencies produce a multitude of statistical tables, this type of reporting has its limitations for specific applications, particularly those requiring very current data. The recent trend is to supply the data in some computer-usable form that will allow rapid updating, selective reporting, and data manipulation by the end user.

The availability of vessel characteristics and movements data in computer form is primarily dependent on how the data collector has chosen to organize his information. At the present time, computer-based information is disseminated in four basic ways:

(1) The collector of the information produces standard directories and statistical reports from his own computer. These are normally annual or monthly publications.
(2) The collector of the information produces specialized printed reports upon special request of users. These are normally sent by mail to the user.
(3) The collector of information supplies selected information in computer readable form (usually magnetic tape) to the end user, who has developed programs on his own computer to produce the necessary reports and analyses.
(4) The collector of information supplies selected information directly on-line from the collector's own computer or supplies the data to an information company which provides on-line service via an international data network.

The primary sources of vessel characteristics today are the classification societies. Most collectors and publishers of directories and registers at least use the classification societies as their starting point. The technical information is usually captured by the society which will classify the vessel at the time the vessel is

being built. This information is normally quite accurate, but the information does not enter the classification register until after the vessel is in service. Prior to that time, it may appear in either Ships-on-Order Registers or New Construction Registers maintained by classification societies or in the files of independent collectors and publishers of data. Since there may be changes in design during the construction, it is very difficult to keep such a register accurate as to detail characteristics.

When the vessel goes into service, the vessel characteristics details are published in the classification society's register. The larger societies put out monthly supplements, which include changes to ships in service, or new vessels going into service. The classifying society would issue it first, with other societies using this information in the supplements to update their own files and publications. Some societies may use special information they may have on a vessel to update their files, even though they do not classify the vessel. This information is obtained directly from owners or from the society's surveyors' intelligence reports from various shipyards and ports where they are stationed.

The larger classification societies maintain the information in their own computers for automated production of their registers as well as statistical purposes.

There are several considerations which suggest that the discussion of data pertaining to vessel characteristics and movements be divided into two sub-categories, (1) domestic and (2) foreign and/or ocean. The domestic versus international nature of them respectively is one such consideration. The difference in documentation (or lack thereof) is another. A third factor is that the nature of the domestic vessels is largely that of barges, the movements of which require an accompanying vessel, unlike that of oceangoing commerce, where nearly all vessels are self propelled.

Accordingly, the remainder of this chapter is divided into two major sections. The first focuses on oceangoing vessels. A later section concentrates on the characteristics and movements of vessels on the domestic waterways.

Characteristics of Oceangoing Vessels

The classification societies maintain information on the more than 60,000 vessels over 500 Gross Register Tons (GRT). Both the American Bureau of Shipping and Lloyd's Register of Shipping maintain data bases on all these vessels. These two supply published registers, data reporting services, and data tapes to the industry. Lloyd's Register also makes its information available on-line via an international timesharing network.

There are also other collectors of vessel characteristics, some of whom provide the information in computer readable form, but generally they use classification society data to which they then may add other information. This other information may be useful for special purposes in the industry, such as the identification of which large oceangoing

barges are usually connected to which large oceangoing tugs to form an OGTB (oceangoing tug-barge) unit.

Maintaining identification of a vessel according to its name is often a problem. Since this changes with ownership, a ship may be sold and the name changed without imemdiate notification to the classification society. The old name may be carried by the society for a period of time, making identification more difficult.

A means of faster reporting of name changes would assist this particular problem, particularly if that name became available through an on-line register. It would be beneficial as well to be able to look up the vessel's prior names for cross-reference to its new name.

Compounding the problem of constant and consistent vessel identification is the fact that there is no single form of identification that is sure to remain permanently assigned to the ship. Although there is no officially accepted numbering system, the most widely used vessel numbering system today is the Lloyd's Register number, which stays with the vessel even when ownership or flag is changed.

Associated with the problems of changing vessel identity is that of a clear identification of the effective ownership of the vessel. At the present time, the classification societies only report the "Registered Owner" or legal owners, who may be an unknown corporation or even a bank. This does not provide adequate information on who actually is operating or controlling the vessel. This information is quite important from the standpoint of trade valuation.

Having an additional entry in the register of who is the actual operator of the vessel, linked to the registered owners or vessel numbers would assist in resolving this problem. Lloyd's Register is currently developing this in association with Lloyd's of London Press.

The identification of a vessel according to its type (i.e., tanker, bulk carrier, ro/ro, container) is one of the most needed data items for use in commercial trade statistics and market evaluation. Unfortunately, there is no common identification coding by type between the classification societies. There is not even an agreement on what a vessel may be called, such as partial container ships, combination ships, roll on/lift off (ro/lo), lift on/lift off (lo/lo), roll on/roll off (ro/ro), etc.

An agreement between the several classification societies and professional societies would probably alleviate this problem to a sufficient degree. The agreement could, in fact, establish a range of charactristics appropriate to each vessel type, so that such differences as ro/lo and lo/ro would signify different primary capacities (by lift on/off or roll on/off) of a vessel. The on-line register could also include specific ability to look up the exact cargo forms and cargo handling categories applicable to the vessel.

The specification of vessel capacities is a difficult but important data item from the commercial side, since capacities may be stated in various ways. The traditional measurement capacities of Gross and Net Register Tons are not very useful. Deadweight tons are important for tankers and bulk carriers, but not too significant for break-bulk and container ships, which will have cubic limits. Container capacities of

vessels are also difficult to specify where the vessel may be able to switch between container sizes. At present, there is no common way of reporting container capacities.

An interim solution to the problem of identifying container capacity would be to have TEU (twenty-foot equivalent units) equivalents maintained by all societies and published in their registers. The question of actual capacity by container size is a more difficult one, particularly for vessels that carry only partial container cargoes. Another problem is the inability to give accurate capacities of containers on deck. Some means for rationalizing and standardizing these various measures of capacity is needed.

In addition to maintaining up-to-date and complete information on cargo forms and capacities applicable to each vessel, it is often difficult to keep the data correct on changes that may be made to the cargo handling gear. It is also found to be difficult to classify and describe special loading and unloading equipment carried aboard specialized vessels.

There are various types of equipment that may be added to a vessel during its lifetime, such as heating coils or inert gas systems for tankers, or collision avoidance or navigational systems for any vessel, that should appear in the classification records. It is difficult for each classification society to keep up-to-date information of this kind, particularly for vessels classed by another society.

A reasonable solution that would alleviate these several problems pertaining to cargo handling and special equipment appears to be some international agreement on reporting important changes to the vessel to the classification societies. Presumably, encouragement for this step could come from the U.S. Coast Guard.

There are two figures--speed and fuel consumption--that are most important in determining the economics of a particular vessel, but may vary according to how the vessel is maintained and operated. There is no agreed upon definition on what the vessel speed represents (i.e., trial speed, service speed, average speed, etc.). The numbers in the society registers are primarily those supplied by the owners without definition. Fuel consumption is also usually an owner reported number. Considering the importance of those two figures on the economic viability of vessel utilization, it is notable that classification societies do not agree on definition of the term speed, and do not have a more scientific method of assigning it. The listed fuel consumption should also be related to a horsepower figure, as should some standardized measure of speed.

An additional type of vessel characteristic that is often sought pertains to its history of casualties, if any. For port-entry clearances and Coast Guard inspections, those data would prove of significant benefit in decision-making, especially when coupled with the availability of information pertaining to recent ports of call, cargoes previously carried, and prior vessel safety inspection reports.

Movements of Oceangoing Vessels

The primary supplier of international vessel movement data is Lloyd's of London Press, Ltd., in Colchester, England. More than 1200 Lloyd's agents, located in parts around the world, transmit ship arrival and departure dates to the Lloyd's office by various means.

This information is updated daily into computer systems through numerous on-line video terminals. There are certain editing checks made. The information is also periodically checked to see what vessels have not been reported over an extended time period, in which case requests are then made to the owner/operator concerning its recent activity.

The primary purpose of this system is to provide a daily and weekly magnetic tape to facilitate automatic type setting fo the printing of the daily Shipping Index, a publication showing the latest port calls of over 30,000 vessels. It also produces a weekly publication called the Voyage Summary which gives the port itinerary or port calls for each vessel.

Lloyd's provides a service whereby special reports are produced from its computer and mailed to clients who request specific types of searches of the data. They also provide the information in magnetic tape form to various organizations who have developed their own in-house computer programs to process the date. The information is used in this form by a number of Departments of the U.S. Government.

There are no other known public sources of information whereby international vessel movements are tracked, although the U.S. Navy, other organizations, and other governments may do so without publishing the fact.

Concerning the quality of the Lloyd's vessel movement data, as with any large data base, there are, of course, certain deficiencies. In this case, it appears the system and organization is available to provide the information in a fairly current manner, with the deficiencies correctable provided the necessary resources are expanded. However, there is a problem of government refusal to permit collection of data under certain circumstances considered vital to the protection of national security.

Currently, the information pertaining to ships movements is sent into the Lloyd's Intelligence Service Headquarters in Colchester, England, by various Lloyd's agents around the world. The information consists of identifying a vessel by name and giving its arrival and departure data and also the previous port and port of destination if available. In ports in the world where the governments will not allow such information to be sent out of the country, gaps are introduced in the vessel's voyage records unless the next port can fill in the information by giving the last port. This is often not the case, and the port call records will be missing.

In addition, there are certain areas of the world where the Lloyd's agent does not obtain full information on vessels arrivals or departure, perhaps because of remoteness of ports, such as offshore oil ports.

The information gathered and forwarded by the Lloyd's agents includes arrival and departure dates and identification of the vessel and port. There is information on the vessel concerning registered owner and vessel type within the Lloyd's system, but they are coded by Lloyd's to their own internal codes and classifications. They also have the Lloyd's Register number as an identifier within their data base.

There is no indication of whether the vessel is loading or discharging or what cargo it may be carrying. This of course limits the data as far as being used for analyzing cargo movements, although the data still have their uses. (As an example, the U.S. Maritime Administration first used the data to identify all vessels in particular foreign trades. They then were identified as to whether they were liner vessel or bulkers in a tramp trade.) The information on next port call is not very complete, and the itinerary of the vessel may change after departure, so the next-port information does not have nearly the same confidence level as data on past port calls.

A more detailed breakdown of the ship type codes using some industry standard would make identification of vessel type easier. It might also be possible to report the port name down to the actual loading berth, giving a better indication of cargo they may have handled. The fact that Lloyd's Register number is given, presents the opportunity to cross reference to more detailed ship characteristics data bases.

The data transmitted by the Lloyd's agents may come to the collecting office by mail or telex. When the information comes by mail, a previous port call may not be entered until after a later port call sent by telex was entered. The average time for a vessel's latest port call to appear in the data base is about two to three weeks. This is adequate for most statistical reporting but not very useful to predict where a vessel may be prior to a port call.

The solution to receiving the information faster appears to be one of simple economics. If the demand for more current information was high enough, it would be worthwhile for the data supplier to have all information sent by telex instead of by mail, passing on the higher cost to the subscriber. Lloyd's plans to make the vessel movement data available on line via an international data network in 1981.

Although there are some apparent deficiencies in the vessel movement data supplied through Lloyd's, with the exception of a few governments' restrictions on reporting, most all the deficiencies could be considerably improved or eliminated through the investment of the necessary resources. Currently, Lloyd's continues tracking over 30,000 vessels on a continuous basis. This suggest that solutions are, therefore, one of demand rather than the more complex problem of cooperation of government agencies or agreement on coding or information security.

In general, an oceangoing vessel is too large a piece of equipment to operate undetected by the public, so that the reporting of vessel movements can be accomplished through simple observation. The question is one of the economics of collecting and disseminating the information to the public.

As this information becomes available to organizations in computerized form, its usefulness can be enhanced and additional information gained through statistical analysis that could meet the particular needs of each party interested in the use of vessel movement data.

Inland Waterways Vessel Characteristics and Movements

This section addresses the area of maritime information involving the characteristics and movements of vessels on inland waterways, intra-port movements, and offshore services. U.S. domestic commerce involves a diverse variety of vessels and widely separated geographical areas. It embraces not only deep-sea vessels involved in inter-port movements, but also vessels operating in the waterways, harbors, and navigable rivers, lakes, and coastal waters of the United States and on the Great Lakes. In many respects the various vessels in domestic service operate in discrete and closed systems. For example, there is litte or no interchange of barges and towboats between the Mississippi River system and the harbors and waterways of the Atlantic and Pacific coasts and the Great Lakes.

The principal sources of data with respect to domestic vessels' characteristics and movements are the data bases maintained and collected by governmental agencies. Because of the diversity of vessel types and the geographic differences in the service in which they are employed, certain vessels such as those which operate in the offshore domestic trades, may be included in the data systems which pertain to deep-sea international traffic. This may be true even with respect to oceangoing barge carriers such as LASH and SEABEE.

For domestic trade, the principal agency with authority to require the collection of data is the Corps of Engineers. The Coast Guard also plays a role as an initial collector of data through its documentation and inspection system, but not all domestic vessels are documented and/or inspected. Independent regulatory agencies such as the Interstate Commerce Commission, the Federal Maritime Commission, and the Maritime Administration also are initial collectors and users as are the Waterways Journal and the Fleet Data Service in the private sector.

Any description of the users and uses of maritime data pertaining to domestic vessel movements and characteristics in the domestic trade may be broken down into two broad categories: governmental and private. Governmental agencies collect and use data in four broad areas: (1) operations; (2) regulation and safety; (3) promotion; and (4) planning.

The governmental collection of much of the data has grown out of the requirement placed on the Corps of Engineers to plan, design, construct, operate, and maintain the navigable waterways, locks, and harbors of the United States. As a result, much domestic maritime data has been shaped by the Corps' interpretation of its needs in order to serve the duties imposed upon it by statute.

An example of governmental regulatory and safety functions is the activity of the Coast Guard in maintaining a system for the documentation and inspection of vessels, for regulation of navigation, and for control of pollution and the handling of hazardous materials.

Domestic maritime data have been collected and used to carry out numerous governmental promotional activities. These originate at federal, state, and local governmental levels of promoting the development and use of waterways, ports, and transportation systems. Samples of government users are the Maritime Administration, state development agencies, and port authorities.

Lastly, regarding government activities, accumulation of maritime data in the domestic field has been necessary to afford the data base for governmental planning of future maritime projects and transportation systems. This also occurs at federal, state, and local levels.

The other broad, non-governmental users of maritime data pertaining to domestic vessel characteristics and movements is the maritime industry in all its facets. These private organizations are users of such data for business operations, forecasting, planning and investment.

The Corps of Engineers and the Coast Guard are the principal government agencies charged with the collection of domestic vessel characteristics data. The Corps maintains a data base listing all the vessel operator information and certain vessel characteristics. A listing of the data, by geographical regions, is published annually. The Coast Guard maintains two data bases pertaining to vessels: the first includes all vessels which are documented (either registered or enrolled and licensed); the second includes all vessels which are subject to safety inspection (documented or undocumented). In addition, it maintains a data based on merchant vessel casualties within U.S. territorial waters.

With respect to vessels which are documented and which operate in the offshore domestic trades, the characteristics of these may be found also in such private compilations as Lloyd's Register and the registers of other classifications societies. To the extent, however, that these vessels are so included, references should be made to the problems which are discussed in the previous part of this chapter pertaining to deep-sea vessel in international trade which apply equally to data or vessels moving in domestic trades.

Insofar as maritime data for domestic vessel characteristics is concerned, the following problems and suggested solutions appear to be the major current ones.

Lack of Common Identifier for Vessels Between Data Bases: There is no common identifying number by which the vessel characteristics data base of the Corps of Engineers can be integrated with that of the Coast Guard. Currently, the Corps assigns, for its internal use, its own WCSC number for each barge or vessel. The Coast Guard also assigns an official number which is different for each documented vessel. In those instances where the law requires the Coast Guard to inspect an undocumented barge because it carries flammable liquids, the Coast Guard has made a practice of assigning an inspection number for that

barge which is then included in the data base for inspected vessels and barges. While many barges and other equipment may have been documented in order to take advantage of the Ship Mortgage Act, 1920, there is no legal requirement that a non-self-propelled barge be documented. As an added complication, many onwers give their own barge numbers as the official name of a barge even when it is documented. The result is, at the present time, there is no single identifying number which can be used to combine the data bases of the Coast Guard and the Corps of Engineers.

In seeking a resolution to this problem, apart from legislation to establish a single number for all vessels, including barges, whether or not documented, it would appear that the Corps of Engineers and the Coast Guard could take steps to adopt a system by which barges not having a Coast Guard number should be given a number by the Corps of Engineers; this would be then used for that barge by both agencies. Such a number would enable the two data sytems to be compatible and the available data could then be combined, probably at some cost saving to both agencies.

Lack of Accessibility of Data on Vessel Characteristics: The published data on vessel characteristics list type of barges without providing any means for categorizing different types nor summarizing characteristics.

In moving towards a compilation of Corps and Coast Guard data, computer based classifications could be adopted which would permit segregating barges by types, characteristics, and uses. This would permit planners to ascertain the types and availability of present equipment.

Domestic Vessel Movements: Domestic vessel movements data are collected, processed, and maintained by the Corps of Engineers in essentially two data bases. The first is in the publication entitled Waterborne Commerce of the United States [11] (described in Chapter 3) which provides information, in part, with respect to trips and drafts of vessels by harbor, waterway, and by type of vessel and direction. The information is based on reports filed by operators which include information additional to that published. For example, the magnetic tapes of the data collected by the Corps are used by the Maritime Administration to prepare its domestic trade system series which, while focusing on domestic commodity movements, includes vessel movement data.

The second data base (also described in Chapter 3) is the Performance Monitoring System, recently inaugurated by the Corps, under which all individual vessels and tows moving through locks are reported on forms tendered by vessel masters at the lock. This data base has been computerized to permit access by Corps personnel.

The Performance Monitoring System serves as an accurate record and check of vessel movements by monitoring movement through the locks. Two limitations are that not all river segments have locks and, to the extent that there are movements in the segments between locks, accurate information must depend upon the operator-filed reports. In some river

segments, there is signifcant movement which is not recorded. Here again, educational efforts would seem to be the only realistic solution.

The tracking of intra-port and offshore service vessel movements has been largely overlooked by the larger community of statistical data users, although it constitutes substantial utilization of our waterways. Traditionally, in certain ports in the United States there have been established private Marine Exchanges which have served to provide local sources for arrivals and departures and berthing information with respect to vessels. Recently these Exchanges have joined to form a national association which will increase the availability of information.

CHAPTER 6

PORTS AND WATERWAYS

Maritime Statistical Data Relative to Ports

Ports play a crucial role in the maritime commercial system, acting as the link between the terrestrial producers of trade commodities, or consumers of those commodities, and the ocean or inland waterway transport medium. The development of ports began more than 5500 years when commerce flourished on the Mediterranean, the Adriatic, the Red Sea, and the Persian Gulf. The structures that surrounded the natural harbors in these bodies of water were well constructed and served their purpose well until the fall of the Roman Empire. Despite the excellent planning that went into the construction of seawalls and breakwaters of early ports, a gradual deterioration took place due to environmental effects and a general downturn in waterborne commerce. It was not until after the age of exploration and colonization in the 18th century that ports again entered an era of significant expansion to accommodate the flow of commerce between port hinterlands and the other countries of the world.

The shipping industry and its demand for port facilities has grown rapidly in the last two hundred years as a direct function of world population growth and the resulting demand for goods. This in turn has called for more and larger ships to transport an increasing volume of trade. Accommodations had to be provided to dock vessels rapidly and safely, to unload and load them, to move cargoes to and from the points of loading, and to provide ships with services such as food, fuel, water, towing, and repairs.

Each port facility of major size requires several years of planning and construction. An important aspect of the planning is a reliable forecast of the types and sizes of ships that will be handled and the characteristics and containment of the cargo that will flow between the port hinterland and the ships that will be loaded and unloaded at the facility. This intensive planning activity must be based upon forecasts derived from the best data available. Quoting from the Maritime Transportation Research Board publication Port Development in the United States [12]:

> "To evaluate the effects of technological changes and consequent shifts in the hinterland-port relationship for many

commodities, it is highly desirable to have historical and forecast data to trace the trade routes of water borne imports, exports, and coastwise movements of major commodities from source to destination. Data on exports, for example, would show the volume of a given commodity that originates in a particular U.S. hinterland, moves through a specific port range, and terminates in a certain foreign destination. To fulfill this format, data would necessarily include the following:

- Commodity flows for all significant movements;
- Trade routes indicating foreign origins and destinations, by commodities and countries;
- Volumes of trade by significant commodities at U.S. ports, aggregated by regions; and
- U.S. hinterland origins and destinations by significant commodities and volumes."

It is, therefore, natural for those concerned with port planning and operations to take an active interest in the activities, not only within their own jurisdiction, but also in the entire pattern of domestic and foreign maritime commercial enterprise. Ports are both originators and users of maritime statistical data. And, as data users, they fall into the categories of both primary and secondary.

Data Originated by Ports: One type of data originated within ports themselves comprises primarily the physical characteristics of the port and its approach waterways, the waterside facilities for accommodating various types of vessels, cargo handling equipment capacities, storage facilities and their capacities, passenger facilities, ship services available, and data on the modes of inland transport that serve the port. In effect, the originated data encompass all of the information needed to assess the total capability of a port to accommodate and service ships and/or barge tows and to transfer cargo and passengers to or from other modes of transportation.

Another type of data originated within the confines of a given port is that related to internal vessel, cargo, and passenger movements. This includes both movements between facilities within the port area and transfers between vessels and truck, rail, air, pipeline, or other marine modes of transport.

Data acquisition is generally a function of the port authority or other organization or agency that manages port or terminal activities. Since a port authority is one primary user of much of the data that it orginates, data acquisition is handled in a timely and efficient manner, at least insofar as the data needed for promoting port activities are concerned. Other data, required by certain government agencies but not by the ports themselves, may be collected by the primary user agency directly or may be obtained from the port authority or operators of individual terminals; here the collection process may be neither as efficient nor as timely.

Although ports generate a good deal of information about their facilities and equipment, their capabilities for accommodating number of vessels, and the availability of land transportation for moving cargo to and from the port, they often do not generate data from which the throughput capacity of the port can be determined. Physical data alone are not sufficient for estimating this capacity and, since operational data are not readily available, port planners are frequently required to conduct specific surveys in order to acquire the information necessary for adequate planning of port expansion or the development of new ports. Yet this question did not arise during the regional meetings nor has it been brought to the attention of the committee until recently. However, it would appear to be to the advantage of the ports themselves to collect and process such operational data and to maintain current statistics that would be available for port planning usage.

Government Users of Port Data: The Corps of Engineers publish reports identified as the Port Series. For any individual port, a report may be issued about every ten years. As a result the Port Series reports may encompass information that ranges from one to ten years old. Each wharf, pier or dock facility in a given port is mapped and each facility is assigned a code number by the Corps. These numbers or identifiers are then used by the Corps to describe the point of lading or unlading of cargoes in a port. This information is used in turn to determine the amount of use that is made of various port facilities and channels, in order to decide if Corps maintenance dredging should be continued, expanded, or deleted and to forecast the effect on commercial use of ports, harbors, and waterways of alterations of a waterway's character that might affect waterborne trade and transport. Apparently the demand for current information has not been great enough to force an increase in the frequency of publication of this series.

The Maritime Administration also accumulates data, in its Ports Facilities Inventory, on port characteristics and facilities as well as other pertinent information with regard to operation of coastal ports which can accommodate vessels of up to 20 feet of draft. This information, compiled in a computerized data base, is required by MarAd to fulfil its mandate to take over the operation of all such seaports in times of national emergencies. These data are not published but are available from MarAd upon request. For the range of U.S. ports that are covered by this mandate, the Maritime Administration Port Facilities Inventory is generally more current than that published by the Corps of Engineers.

Port Problems with Utilization of Maritime Statistical Data: A port is a primary user of those port-originated data that it requires for managing port operations, for levying fees, for upgrading facilities, for acquiring property and facilities, and for promoting the flow of commerce through the port. In connection with the latter three of the above five uses, a port is also a secondary user of data summaries obtained from the Corps of Engineers and from the Bureau of

the Census as well as from other sources such as liner conferences, consultants, Lloyd's, and so forth.

Facility upgrading, acquisition, and expansion of existing facilities and property, and port promotion are all related directly to increasing the business and profits of a port. For these purposes, port planners utilize not only the data generated by their own port, but they seek information on commodity flow through competing ports. Furthermore, they are highly desirous of obtaining data on sources of cargo, on both domestic and foreign markets, and on the routes and modes of transport of cargo from source to destination. 'In-house' generated data do not, as a rule, provide details of marine trade by countries and commodities nor do they provide comparisons with competing ports.

Concerns repeatedly expressed by port interests have been the desirability of obtaining access to data on the inland true origin/ultimate destination (TO/UD) by cargo type and quantity flowing through U.S. ports. Conferences on port industry data needs in 1976 and 1977 also found that: "The participants felt that the types of statistical data most needed by the industry were container and origin/destination information, as well as long-term forecast data."[13]

The primary conclusion reached at a third conference in 1978 followed the same vein:

> "The need for the port industry to be able to secure inland origin/destination information on import/export traffic is so important that individual officials of the port community should contact the Bureau of the Census to endorse the recommendation already made by the American Association of Port Authorities and the Maritime Administration that such data be collected and disseminated regularly and fairly frequently."[14]

The governmental sources of port commodity flow information include the Foreign Trade Division of the Bureau of the Census and Corps of Engineers Waterborne Commerce Statistics Center. The Corps does not presently acquire inland TO/UD data on cargoes moving through U. S. ports nor data on needs of inland transport. It appears that there is no feasible way, short of a significant new data collecting effort, for these data to become public.

Census acquires data from Customs manifests on ports of loading, unloading, commodities, tonnage, and value. From these are developed the foreign trade statistics. These summaries are available in the form of photo copies, magnetic tapes and microfilms. The identification of the true place of manufacture (true origin), and the true place of consumption or destination for cargoes carried in foreign trade, is not normally acquired by Census from the documents provided to Customs when a vessel arrives or departs a U.S. port in foreign trade. Census, however, never sees the vessel manifests; the manifests of vessels arriving and departing are on file in the Customs Offices at U.S. coastal ports for each vessel's arrival/departure. The manifests are used by Customs officials to assess duties and to screen incoming

cargoes for contraband and potential agricultural pests. The manifest lists, among other things, the names of export manufacturers and consignees as well as the characteristics of the cargoes. The manifests are accessible to newspapers; the linking of firm names with cargoes, and publishing this information on a timely basis, is a principal endeavor of the Journal of Commerce.

Nevertheless, port authorities are unsatisfied with the Journal's product because consignees and export firms listed on the manifests are not always an indication of the TO/UD of cargoes. Furthermore, the Journal's data do not show the inland mode of transport nor whether cargoes are containerized. Neither is this information available from Census reports since Census does not compile the data.

The Bureau of the Census, with the financial assistance of MarAd, Corps of Engineers, and DOT has prepared a study entitled Domestic and International Transport of U. S. Foreign Trade: 1976. [15] (There was a similar study for 1970 data.) This document meets, in a limited fashion, the demands of the port industry for TO/UD data.

This problem may ultimately be solved by initiatives being taken by the Bureau of the Census. The Bureau of the Census requires that Employer's identification numbers be shown on Shipper's Export Declarations (SED). In January 1981, Census began compiling this information; this permits some preliminary analysis of TO of cargoes. Furthermore, the Foreign Trade Division of the Bureau of the Census plans, by 1987, to obtain permission from the Office of Management and Budget (OMB) to revise its SED forms so that a box is created on the forms to show the state of origin of the export and to arrange for the Customs Entry Form #7501, which is on file in the shipment's port of entry, to show the state of ultimate destination for imports. [16] TO/UD information is also known to the liner conferences, who have been known to share their information with port authorities occasionally.

Port planners have expressed a desire to know precisely what cargoes are moving in container boxes. These data are useful for forecasting future container facility needs as another datum in the continuing surveying of competing port trade.

Again, this is an "old" problem and was discussed in the three conferences on port data needs sponsored by MarAd in 1976, 1977, and 1978. While some progress on the problem was reported in 1978, the problem has not really been resolved, as evidenced by comments made at the Maritime Information Committee Workshops and at the May 1980 meeting of the Foreign Trade Data Users Working Group. The solution to the problem seems to be to add a box to the SED and Import Consumption forms which would be checked if the cargo were containerized. At present, Census has no way of acquiring the information from the documents available to it. However, revising such forms requires approval by OMB.

Port analysts frequently develop inferential data on container movements through ports by relating cargo type to type of vessel of carriage (liner, tanker, tramp). These relationships are contained in the public use tapes of the Bureau of the Census - the monthly SM705 and SM305, or alternatively the annual SA705 and SA305 tapes. It has

been suggested that if Census and Customs would add a fourth vessel category, "full container vessel", the inferential analysis would be facilitated.

Port planners have also expressed a need for data on the transportation mode of cargoes moving to and from the port whether by truck, rail, water feeder service, or by air. This information could help them adjust the physical arrangement of ports to trends in cargo movement. For example, the scope of a port's hinterland may change by greater intermodal use of ship-rail and ship-truck carriage to and from the interior of the United States.

Safety of Vessels Moving Within Port Areas: The vast majority of vessel casualties occur in port areas or within the approaches to ports, and are the result of rammings, groundings, and collisions with piers, wharves, quays, and lock walls [16]. The study reported herein did not include vessel casualty statistics but it did encompass those maritime statistical data that are relevant to the potential occurrence of casualties. Such information includes vessel movements within ports, the amount of traffic entering and leaving ports, and physical data regarding channel depths, navigable areas of approach and harbor waterways, and those factors from which traffic density can be determined.

The responsibilities for the acquisition of such data are currently either not assigned or they are divided among different organizations in both the private and public sectors. The Corps of Engineers is responsible for maintaining channel depths and published maps and reports on channel depths. The National Ocean Survey collects and reports data on depths, tides, and currents. The Coast Guard is responsible for maintaining aids to navigation and for monitoring port traffic. Port authorities have some control over inbound and outbound vessel movements. Private operators of tugs, barges, and ferries, and pilot associations are often the most knowledgeable sources on vessel movements within the ports.

In all data reporting systems relating to both vessel and cargo movements in ports and waterways, the processing and dissemination of statistics have historically been long-term operations. Data on movements are made known to interested parties long after the movements have taken place. In fact, the collection of many forms of pertinent data often takes place weeks after the actual date of the movement and dissemination to government agencies and the public may not occur until one or two years later.

Statistics developed from such data are not usable for any real-time requirement such as analyzing current traffic flow patterns to prepare for traffic overloads, for scheduling port facility utilization or for taking advance steps to reduce the danger to the populace in the movement of hazardous cargo. This points out a need for developing a real-time system for vessel safety. Such a system could also prove valuable in short-term planning for port facility operations.

It has been pointed out elsewhere in this report that the future trend in reporting of vessel and cargo movements will be by

computer-to-computer linkages between ship operators and the data collection agency. Similar forms of reporting are feasible in the case of local movements within port areas. With such a reporting system in operation there is every reason to believe that real-time reporting of movements will be even more efficient than reporting long after the movement has taken place. If real-time movement data become available, they can be readily utilized for traffic management and control purposes. Similarly, the efficiency of port and waterway utilization can be improved significantly and potentially dangerous situations in the movement of hazardous cargoes can be avoided.

Incongruities in the Reporting of Port Activities: Because of some definitions employed or methods of categorizing maritime vessel and cargo movements, it is often possible that published maritime statistical data will be interpreted inaccurately to the detriment of the ports and to the validity of the study being made. Two examples should suffice to depict these incongruities.

Approximately 10 percent of the crude oil brought by tanker from foreign sources to the United States is discharged at Portland Harbor, Maine; this makes up about 92 percent of the import tonnage of Portland. Corps of Engineers Waterborne Commerce publications reflect this. However, Customs does not consider this as an import for tariff purposes since the crude oil is being piped directly from Portland to Canadian refineries. It is not technically a U.S import for assessing tariffs, it is "in bond" until it returns to the U.S. for consumption as a refined product. If only tariff import data were examined, one would conclude that Portland was of insignificant value as a port and that the tanker traffic in and out of Portland Harbor was nil. Because of lack of consistency in definitions, such omissions in official publications are not uncommon. For example, cargo moved from an import port to an export port in bond can likewise be ignored in national summaries. Although the cargo movement is technically correct as defined, the ship traffic data evolved from such reports may be totally erroneous.

Many river ports of the United States are presently represented in Corps and Census publications as being engaged almost exclusively in domestic trade activities. In fact, several of these ports are official U.S. Ports of Entry, providing the same services to foreign trade cargos as deepwater ports. Cargoes moved by LASH and SEABEE barges originate and/or terminate under Customs seal at river ports. These barges (as in the case of an export movement) will then be towed downriver to a deepwater port, loaded on an oceangoing ship, and depart the U.S. Nevertheless, they are listed in the Corps' waterborne commerce statistics under the river port as a cargo laden in domestic trade, whereas the credit for the foreign export is assigned to the down-river deepwater port.

River port authorities would like to see this situation changed, inasmuch as they sense the loss of recognition for export cargoes. Their marketing departments could employ such recognition to capture additional foreign trade business for the river port. The problem appears to be that since Census does not acquire TO/UD data for cargoes

it documents on arriving and departing deep-sea vessels, as described above, it has no way of knowing which cargoes are really originating at a river port. The Corps likewise has no capability to document what becomes of cargoes once they arrive at destination up- or down-river (or from whence they originated). The Rivers and Harbors Act of 1922 gives the Corps the right to collect data on domestic carriage on the inland rivers but the Corps has not chosen to interpret this mandate to include a more comprehensive documenting of cargo such as its TO/UD. This implies the necessity of creating a new category for such cargoes in the Corps' Waterborne Commerce Reports.

Maritime Statistical Data Relative to Inland Waterways

The movement of both domestic and foreign cargoes on the inland waterways of the United States constitutes a highly efficient and most profitable element of the maritime industry. The acquisition, processing, and dissemination of data relating to this transportation system has been assigned by Congress to the Corps of Engineers. These data show that in 1977, total waterborne domestic traffic totalled 972 million tons; the barge and towing industry handled 494 million tons of this cargo on the inland waterways and 640 million tons of all the domestic waterborne traffic. Thus, barge traffic on the inland waterways accounted for about one-half of total domestic waterborne commerce and total barge traffic accounted for about two-thirds of total U.S. domestic waterborne commerce.

Vessel and Cargo Movement Statistics: The data collection systems covering the movements of towboats, barges, and tows and their cargoes between inland waterway ports have already been described in previous chapters of this report. However, these descriptions will be briefly recapitulated here. Basically, two data collection systems are in operation.

For each trip made by a towboat or barge, the operator is required to report monthly to the District Office of the Corps of Engineers the commodity and vessel trip data. These data include the designation of the commodities carried and the total weight of each commodity. Additionally, the departure data and arrival data at the point of loading and the point of discharge are reported as well as the owner's designation of the barge in which the movement took place. These data are assembled by the District Office on a monthly basis and forwarded to the Waterborne Commerce Statistics Center (WCSC) for processing. It is estimated that about 10 percent of all the movements covered by this system are not reported.

The Performance Monitoring System (PMS), described in Chapter 3, also aims for 100 percent reporting and involves the collection of much more data on cargo and tow movements, plus lock operations. However, the data collection takes place only when barges pass through locks. Any traffic between locks or from the last lock to the mouth of the river is not covered by this system. As an example, the upper Mississippi traffic from St. Anthony Falls, Minnesota to St. Louis can

be delineated by this system with reports from 27 locks but, from St. Louis to New Orleans, the PMS provides no data.

Hazardous Cargo Movements Data: At the present time, there is no capability for monitoring the movements of hazardous or contaminating cargoes on inland waterways on a real-time basis and only a limited capability to monitor such movements after the fact. Although the Corps of Engineers has the responsibility for acquiring data on river use, it does so by systems that provide movement data up to a month or more after the movement has been made. Neither the Corps nor the Coast Guard has the capability to monitor hazardous cargo movements as the movements occur. In addition, the generalized commodity codes used by WCSC and PMS do not allow specific identification of hazardous cargoes. The Corps can only report hazardous cargo movements by general categories. Thus, it is not possible to know what cargoes are afloat at a specific time and, therefore, it is not possible to manage river movements to reduce the chances of accident were the information available. Particularly, hazardous tows might be given special escorts (as in the case of LNG ships entering New York Harbor), or the tows might be rescheduled for movement near population centers or through difficult passages at time of minimal river traffic. Meeting and passing of hazard-bearing tows could be minimized or scheduled to occur in wide channels or uncongested areas.

As in the case of port traffic, the trend toward computerized reporting should be encouraged to include transmission of real-time data to traffic control authorities and to other operators. By these means, many potentially disastrous situations might be avoided.

Barge Casualties and Waterway Characteristic Data: Data on barge casualties are now being systematically compiled, and there are currently programs for recording and analyzing accidents involving barge tows. Real-time monitoring of traffic flow in critical areas of navigation is possible through use of WCSC origin/destination and PMS lock data where these data are available. Towboat captains immediately report accidents by radio to other vessels. Waterway accidents are reported to the local Corps of Engineers District, and information on major accidents (based on damage value, casualties, or obstructions) is forwarded to the Office of the Chief of Engineers. The District Offices use the information in fulfilling their responsibilities for informing the public on wreck removal, emergency and normal maintenance dredging, lock operations, and planning lock, channel and related bridge improvements. The Coast Guard is usually aware of major accidents that involve hazardous or contaminating materials or that result in extensive damage to shore structures such as highway bridges crossing the waterways or to locks or dams. Major casualties are usually investigated by the Corps, Coast Guard, and the Marine Accident Division of the National Transportation Safety Board. The Corps and Coast Guard also conduct special studies on individual major accidents and the patterns and causes of minor accidents.

As the volume of inland waterway traffic continues to grow, it would seem to be imperative that existing government and public

programs and activities be improved regarding the management of barge and tow movements. This, coupled with real-time reporting and distribution of information on prospective and actual movements would be advantageous in the control of hazardous and contaminating cargo movements and in the overall reduction of the casualties that occur on the inland waterways. It would also provide an opportunity for improved general operations by shippers, waterway carriers, and receivers.

CHAPTER 7

INFORMATION SYSTEMS MANAGEMENT

With modern-day automated data processing (ADP) capabilities, there is little question that data from cargo shipments and other needed maritime information can be handled and compiled easily. The greater problems are those of management of the information, especially the provisions for its collection and verification, and the cost of supplying and processing the information to satisfy the needs of the many constituencies who are the customers for the data and statistics. Chapters 4, 5, and 6 have addressed the types of specific information and statistics needed in terms of cargo, ports, waterways, and vessels. This chapter will address issues involving the management of those information systems.

Systems Definition

When considering any developments in or modifications to data systems, it is clear that whatever is done should adapt the better features of present systems and include a good description of the nature of the information being handled. There must be mutually consistent definitions that do not overlap other data categories, coupled with easily implementable coding that embraces a strong effort at unifying and standardizing the scope and definition of each part of the information. The record of this definition should be held in detailed supporting archives.

Good data system management also stresses that if any consolidation or coordination efforts are undertaken, they should, from the beginning, maintain the levels of detail required to satisfy the needs to be fulfilled. The scope of the samples, including perhaps 100 percent population coverage if necessary, should match the needs. The schedule or frequency of operational or statistical analyses should be determined as far in advance as possible.

Users have perceived several problems with the present arrangements for the handling of maritime information in the United States. A complete tabulation has not been attempted but the identified problems include:

- Lack of central clearing house for maritime data.
- A difficulty in blending data from different sources.
- Insufficient interagency coordination in data collection and dissemination.
- Obsolete information acquisition systems relative to the dynamics of cargo-packaging and handling systems.
- An economic disincentive to ensure accuracy, consistency, and reliability of gathered data.
- An apparent lack of incentives for efficient data handling by government agencies.
- The lack of a general guide to the sources and nature of the available information.

The latter problem has been somewhat ameliorated by the issuance of the Maritime Information Sources: A Guide to Current Data [3]. This guide was the first product of the present study. The remaining problem seems to be informing the industry of the existence of the guide.

One solution to many of the aforementioned problems could be the establishment of a central data base management system and public source center.

Information Collection

A single system and format for reporting data which would span Corps and Customs activities is lacking. Moreover, the existing government and non-government systems and formats are generally inconsistent with each other and often overlap on certain data and data elements. The number and variety of systems and formats poses a complex problem for data suppliers and also data users. Agents, marine terminals, the Bureau of the Census, U.S. and foreign customs agencies, the Army Corps of Engineers, as well as ocean, barge, ship, truck, aircraft, and railroad carriers are using different reporting forms and different systems for their non-automated and automated processing entries. The burden of supplying all of the mandated data in their different forms, and the recording of them in different formats, falls largely on the carriers who are not directly compensated for that work, thus there is no economic incentive for accurate data collection.

During the regional meetings conducted by the Maritime Information Committee, it was reported that formats for data collection would be improved by developing transportation industry standards for waybills, bills of lading, delivery receipts, interchange documents, and interchange agreements. It was suggested that some standardization techniques might be borrowed from the airline industry, and that development of an industry data dictionary would also promote uniformity. Improvement was said to be needed in document completion instructions and in the training of employees. Also, the reported "philosophy" that data collection and handling should be relegated to the lowest level employee in any organization, the economic disincentive at work, needs to be changed.

Uniformity, Compatibility, and Standardization

One problem enunciated repeatedly by industry representatives is insufficient coordination among the government agency data collectors. Perhaps this is not the real problem. There are several coordinating means including the Transportation Research Board and the Maritime Transportation Research Board of the National Academy of Sciences; in addition to standing coordinating committees. The real problem is that while agencies are fulfilling an assigned mission as primary data users, their efficient data management may not be structured to assist secondary users in the government and private sectors. MarAd, the Bureau of the Census, the Corps of Engineers, and the Interstate Commerce Commission have tailor-made their systems to suit their own needs and, to a large extent, based their systems on manual rather than automated data processing. Consequently, the agencies use different definitions, coding, sample size, and frequency. The result is that information cannot be interchanged or co-mingled easily across the boundaries of the interest areas of these different agencies. The good news in this situation is that coordination between the government agencies is improving. They, too, are secondary users of each others' data and they often collaborate on study projects. As a result, there is considerable motivation for compatibility of data and formats.

In consequence of the prevailing situation the secondary user, especially in private enterprise, is faced with the following problems:

(1) he must become familiar with many individual systems and their particulars;
(2) he may not be able to make some compilations because some data he desires are not collected or exhibit incompatibilities with the others to be compiled;
(3) there may be overlaps or omissions in data collected as a result of incongruent agency jurisdictions, and
(4) if he is using earlier studies, he may find that they are based on different time frames, sample scopes, sampling frequencies, or other mismatches that make trend studies difficult.

This is a wasteful use of public resources in terms of modern day capabilities. The principle of budgeting each governmental agency for mission-oriented programs is wise, but some compromise should be made where a large number of parallel and potentially overlapping data systems result. Viewed in a management sense, the following thoughts apply:

- Modern automated data processing offers opportunities to handle great masses of data with significantly improved flexibility and speed.
- The transportation system of the U.S. can be viewed as a complex of modules, each involving vehicles, shipments, and modal and intermodal facilities. Viewed thusly, the functional similarity suggests possibilities of analagous data management systems offering greater opportunities for compatibility and interlocking.

- The prevailing motivation for uniformity, compatibility, and standardization among information systems, both public and private, ranges from casual to negative.
- The jurisdictive domains of government agencies overlap in some areas and leave gaps in others. Thus, their data base scopes do not dovetail.

Identification

A continuing problem in the processing of maritime information has been the definition and coding of some of the content. Notable among the identification problems are the origins and destinations of shipments, the cargoes, commodities, and the ships themselves.

True Origin - Ultimate Destination (TO/UD): The lack of the information on the true origin and ultimate destination of imports and exports, as well as domestic shipments, may be attributable in part to the lack of a satisfactory coding system to identify geographic locations.

Geographic subdivisions that are included with the present-day data bases are incompatible in some ways. For some data bases, the statistics are available by port regions or channels, for others by states, groups of states, or selected regions only. The various regional subdivisions are often not co-terminal with one another, thus yielding an inability to avoid double counting or miscounting of many movements.

For many TO/UD uses, county, Standard Metropolitan Statistical Area (SMSA), and Bureau of Economic Analysis (BEA) geographic identification is sufficient. However, in contrast to these general locations, marketing departments of the ocean carriers, of port authorities, and of overland carriers are interested in a more exact definition of the source and destination of the cargo. In fact, they would prefer to know which manufacturers and consignees are actually involved, and that would call for a very precise address.

The solution to this micro-geographical address problem must be uniform, world wide, and stable. It must designate locations uniquely with acceptable specificity for every TO and UD. Three existing coding systems deserve mention. They are the Standard Point Location Code (SPLC), the Federal Information Processing Standard (FIPS), and the U. S. Postal Service zip code.

The Standard Point Location Code (SPLC) is a geocoding system designed for transportation purposes and containing 125,000 points. It originated in 1965 from a joint project of the American Trucking Association (ATA) and the Association of American Railroads (AAR). The code contains a Six-Digit Code structure for regions, states/provinces, counties, and "points" such as towns, and a three-digit sub-code structure for locations within points such as metropolitan areas. The code is compatible for both the truck and rail industries, and is potentially useful for the water transportation industry. It is maintained by the National Motor Freight Traffic Association (NMFTA)

and AAR, and is widely used by the trucking and rail industries. It is also used by the Corps of Engineers and ICC, respectively, in their waterborne commerce and rail waybill data bases. The Corps of Engineers is now assigning SPLC town codes to its list of piers in the U. S.

The National Bureau of Standards (NBS) of the Department of Commerce has issued Federal Information Processing Standard (FIPS) publications for states, counties, towns, and other points, The FIPS-55 Publication, first issued in June 1978, contains over 136,000 codes for places in the United States. It implements codes for points in the U. S. as developed by the American National Standards Institute (ANSI). NBS is matching the FIPS-55 data base with that for the Gazeteer of the United States, which is maintained by the U.S. Geological Survey of the Department of the Interior. A project involving five federal agencies and several key elements from the transportation industry is developing a one-way bridge from the SPLC to the FIPS-55. When the bridge project is complete, the Corps of Engineers will assign FIPS-55 codes to U. S. piers. The SPLC/FIPS-55 bridge will assist in potential future Federal reporting requirements that may be levied on the transportation industry and in automated traffic data bases, tariff filings, rate retrieval, and data interchange.

The zip code symbol of the U.S. Postal Service has proved most effective for mail delivery. It has been adopted by several commercial delivery firms. The five digit symbol is carefully defined and the definitions are readily available through catalog or telephone. The five digit identifier gives 5 to 10 mile square areas in highly populated zones, but yields very broad zones in rural areas. The discussed extension of the identifying numeral to nine digits would help localize the areas.

On the other hand, none of these systems solves the shipping problem because they do not extend overseas. They cover only the United States or the U.S. plus Canada. A global system is what is really needed.

The area of the earth's surface, over 200 million square miles, indicates that the system would require at least nine significant characters for each square ten miles on a side.

Four existing systems appear to be appropriate. Modified Canadian Squares, Marsden Squares, World Meteorological Organization Coordinates, or latitude and longitude. For a one mile square these systems have addresses of nine to eleven significant figures with the Marsden Square having nine significant figures and latitude and longitude having eleven. If the users are content to consider ten mile squares, i.e., 100 square mile units, the address can have five or six significant figures.

The World Meteorological Organization coding appears to be very useful. It has international sanction and the addresses can be obtained from any map that contains latitude and longitude. With eight digits, points can be located within four miles, and with ten digits, less than a mile.

No new geographic location identification systems need be invented, it is merely a matter of making a selection on the basis of accuracy, consistency, uniformity, international recognition, and stability.

Cargo and Commodity Identification: The biggest problem in cargo data record-keeping is the inconsistency among commodity definitions and codes used by different governmental agencies, ocean carriers, shippers, and ports. Sometimes this inconsistency is merely in the level of recording, e.g., 2-digit vs. 4-digit categorization within a particular code. In other cases, entirely different codes are used. The variation of codes is really quite extensive for both domestic and international purposes.

One of the key domestic codes is the Standard Transportation Commodity Code (STCC), originated by the Association of American Railroads and drawn up by the Bureau of the Budget. This code comprises about 25,000 commodity designations but is not correlated with any of the international nomenclatures. Other domestic codes include the Commodity Classification for Domestic Waterborne Commerce (CCDWC) and Performance Monitoring System (PMS), which is an aggregated version of the CCDWC for data collected at locks and dams.

United States imports and exports are compiled in terms of the Tariff Schedules of the United States Annotated (TSUSA). Imported commodities are arranged according to the Statistical Classification of Commodities Imported Into the United States (Schedule A) constructed by the Bureau of the Census. U. S. export commodities are arranged by the Statistical Classification of Domestic and Foreign Commodities Exported from the United States (Schedule B) of the Bureau of the Census. Both Schedule A and B are related to the TSUSA, and sum its 10,000 classes into 3,000 classes of commodities. In 1978, Schedule B was converted on a one-for-one basis to Schedule E which is based on the Standard International Trade Classification (SITC).

Beside being related to the SITC, the imports and exports on Schedules A and E are reported in the Standard Industrial Classification (SIC), which is the U. S. edition of the International Standard Industrial Classification (ISIC), originated by the United Nations.

There is not as much confusion in the international scene, however, as would appear from the foregoing. There exists one code, formerly the Brussels Tariff Nomenclature (BTN), and now the Customs Cooperation Council Nomenclature (CCCN) which is used by most nations for customs, tariffs, and trade statistical classification systems. The United States and Canada are the only major trading nations not using this nomenclature.

For several years the Department of Transportation has contracted with the Transportation Data Coordinating Committee (TDCC) to correlate the Standard Transportation Commodity Classification/Code (STCC) of the United States with the Brussels Tariff Nomenclature and the Standard International Trade Classification (SITC). In addition, since the early 70s, the U. S. International Trade Commission, the Bureau of the Census, and the Customs Service have been collaborating to provide U. S. input to the Harmonized Commodity Description and

Coding System being developed through the Customs Cooperation Council in Brussels. This "harmonized" system feeds into the CCCN and these efforts are scheduled to be completed in 1982 or 1983.

In the meantime several interpretive ADP programs have been prepared so that many ADP records can be converted from one coding to the another.

While adoption of a worldwide standard commodity code may be an eventual solution, there are reasons why the U.S. does not move quickly to the CCCN. The most significant is probably the limited proportion of our shipments that go by sea. Only 5 percent of our rail traffic goes to sea and only 20 to 30 percent of our ocean cargo moves interstate. The STCC, one code used by the maritime industry, ties in with the TSUSA. There are many vested interests in the TSUSA; its rates for assessing duties, and the extensive body of law related to its interpretation. Also, there appears to be a strong constituency prejudiced against a system that is coordinated overseas (Belgium). Because the various domestic and international codes have been developed for different segments of the industrial and transportation components of the U.S. and international economies, there are technical as well as institutional considerations in adopting a single commodity code or reducing the number of existing codes.

Another dimension of the commodity definition problem is the assignment of appropriate codes to identify hazardous or potentially contaminating cargo, contraband, and cargo that may require special stowage or handling. There are practical reasons why the concern about such cargoes will not be the same for the U. S. as it is for the foreign nations engaged in coordinating efforts. For instance, agricultural products that may contaminate the United States may be of little concern to the exporting nations.

Commodity-code weakness is not the only information problem in the recording of international cargo shipments. Another problem is the inconsistency of units of measurement used among the various subdivisions of the maritime data base. The units of measurements involve: weight, volume, and value scalars. These, along with language problems, serve to make the development of a universal cargo description a very difficult task.

Ships, Towboats, and Barge Identification: There are inconsistencies in definition and coding for both oceangoing and inland waterway vessels.

For oceangoing vessels, at the present time, there is no commonly agreed upon coding of data among classification societies, nor is information exchanged in computer-readable form. There are three important information management problems:

- Ship Number: There is no standardized universal ship identification coding system in use today. Probably the most widely used numerical designation on international vessels is the Lloyd's Register Numeral, which is a code numeral assigned to each vessel of over 100 gross registered tons. The numeral itself has no intrinsic significance. An international

agreement designating the Lloyd's Register Numeral as a common coding and symbol system could be a solution to this problem.

- Flag and Call Sign: When a vessel is sold, the owner may choose to change its flag of registry. If this is done, the radio call sign is also changed. Another means of consistent and singular ship identification would be an international agreement assigning international call signs that would stay with the vessel regardless of flag of registry.
- Vessel Type: The identification of a vessel according to its type (i.e., tanker, bulk carrier, ro/ro, container) is one of the data items most needed for commercial trade statistics and market evaluation. Unfortunately there is no common identification coding by ship type among the classification societies. There is not even an agreement on what a vessel type may be called, such as partial container ships, combination ships, etc. An agreement among classification societies concerning at least the definition of ship types would contribute markedly toward the solution of this problem. Yet it is a difficult area in which to obtain agreement since classification societies are, in effect, in competition in the international classification market. Nevertheless, an agreement on coding and definitions would certainly help the industry and reduce the cost of data maintenance. Perhaps this will be done in the future through the International Association of Classification Societies (IACS), but will probably only come by industry promotion.

On the inland waterways there is a similar problem with respect to towboat/barge numbers. There is at present no common identifying symbol by which the vessel data base of the Corps of Engineers can be integrated with that of the Coast Guard. The Corps assigns, for its internal use, its own WCSC (Waterborne Commerce Statistics Center) numeral for each barge or vessel. The Coast Guard in turn assigns an Official Number (different from the WCSC numeral) to each documented vessel. In addition, in those instances where the law requires the Coast Guard to inspect an undocumented barge because it carries flammable liquids, the Coast Guard has made a practice of assigning to the barge an inspection numeral which is compatible with the data base for documented vessels and barges. While many barges and other equipment may have been documented in order to take advantage of the Ship Mortgage Act, 1920, there is no legal requirement that non-self propelled barges be documented. As an added complication, many owners assign numerals as the official name of a barge even when it is documented. The result is that there is no single identifying symbol for barges and towboats. Apart from legislation to establish a single symbol for each vessel, including barges whether or not documented, it would appear that the Corps of Engineers and the Coast Guard could adopt a mutual system by which towboats and barges not having a Coast Guard numeral would be given a collated numeral by the Corps of Engineers. Such a numeral would assist in combining the available data of the two agencies.

Confidentiality

There are four deterrents to the release of maritime information. First, there is the corporate confidentiality generated in the competitive structure, the Macys-doesn't-tell-Gimbels syndrome. Second, there is a lack of motivation in many cases. If an executive thinks he knows more than his competitors, he probably will not release the information (an example is the revenue per ton information held by shippers). This tendency is stronger with the top management than at the working level and has sometimes been referred to as confidentiality paranoia. Third, there is the cost of reporting. And finally, in the case of government agencies, there are laws, statutes, and court decisions which define the manner in which they may release information. The Bureau of the Census, the Corps of Engineers, ICC, and other agencies work under laws which very carefully define how they must withhold and aggregate data so that its identity and source will not be revealed. Generally, there is no sunset limitation on the confidentiality of the Census holdings, so the basic data can never be released.

A great deal of maritime information believed to be useful by secondary users is now held by sea or land carriers, classification societies, and steamship conferences for the above reasons. Some form of encouragement would be needed to promote the release of additional industry information, such as a quid pro quo being offered to motivate the release. Perhaps by appealing to sales and documentation departments it would be possible to demonstrate benefits to industrial enterprises which would overcome their reluctance to release information. On the other hand, it is not wise to over motivate, for instance, by laws with penalties because the result could be submission of false, inaccurate, or incomplete data which would not accomplish the ultimate aim.

One possible way to get more information on trade movements into the public domain is to put a time limit on government held confidential information. A period of two to five years has been suggested, after which historical movements would be released for analyses. This would not satisfy all users, but certainly it would help. The release of "old" historical proprietary and classified information could occur through support from industries supplying the data, government agencies managing the data, the Office of Federal Statistical Policy and Standards within the Office of Management and Budget, and key legislators in Congress.

Accuracy

Inaccuracy in maritime statistical data stems from several basic causes. One cause is the burden of reporting; carriers and shippers are not motivated to report data which they do not themselves use. On the other hand, the Customs Service seldom invokes the penalties available under law and when invoked it is only in cases where there is considered to be "negligence." For imports, widespread compliance and

use of a correction procedure probably accounts for the low level of punitive action.

Poor federal data acquisition practices contribute to the problem. In many cases, data reporters are not actually originators of the data. To fill in gaps in acquired data for statistical purposes, the Bureau of the Census frequently imputes data. This is done primarily for export statistics, and to a lesser extent for import statistics. And finally, there is an almost universal lack of quality inspection of the data.

Some of the data often thought to be inaccurate include the content of the shipper export declaration, weight/measurement information supplied to the Maritime Subsidy Board, tariff quotations by Customs, the basis for imputed values employed by the Bureau of the Census, and barge and tow movements that many small operators fail to report. With the prevailing system, an accuracy of 90 percent in the Corps of Engineers data for example appears to be the best we can expect.

One cause of considerable contention is the crediting of imports or exports to other than the ports of embarkation and arrival. Part of this is caused by transshipment in a coastal port and part caused by the fact that an ocean vessel may make other stops before discharging. This problem is especially acute for the inland ports which want evidence of their role as international trade centers to attract capital for expansion.

In contrast to cargo data statistics, the data statistics on oceangoing ships are generally thought to be highly accurate and most ocean ship movements are also considered to be accurately if sometimes belatedly recorded.

Ongoing accuracy improvements result from increased movitivation showing benefits and providing feedback, from better training of company officers, data reporters, and data processors, and from reduced reporting burdens through fewer, simpler forms and procedures (including ADP editing). The only suggested change to current practice is the institution of an inspection arrangement under which data could be more thoroughly checked.

Timeliness

A lack of timeliness in the receipt of federally held information is probably the most frequently voiced of all complaints. General dissatisfaction and considerable emotion have surrounded this issue, but not too many details have been forthcoming as to what is needed, when it is needed, and the degree of tardiness relative to schedule of needs.

Complaints include the long time needed to obtain vessel movement data. For foreign data, it is from 30 to 60 days. Time delay complaints often have as a target the Waterborne Commerce of the United States [11], published by the Corps of Engineers. Until the 1978 volume, it was usually published nine months after the subject year. Now, however, the Corps of Engineers Waterborne Commerce Statistics Center is undergoing a transition that has slowed data processing and

delayed the publication schedule to a year and nine months. When the transition is complete, on-line computer access to the data will be available.

Other statistical data are needed more quickly and more frequently. For example, the information on Canadian diversion-type cargoes should be available in less than one year in order to be of value to the majority of users.

General Opportunities and Problems

There was a widespread view among the participants at the regional meetings that maritime information management can be improved by better organization and coordination among the agencies that are responsible for the collection and dissemination of data. The capabilities of modern automated data processing offer additional opportunities for greater efficiency and low cost products, especially to secondary users.

Progress toward more useful systems is slowed for secondary users because there is little provision for time to introduce their needs into the system planning. Progress is slowed for all by prevailing mission jurisdictions, extension of obsolescent data handling methods, and the multiplicity of data management centers. The result is lack of uniformity and compatibility among data acquisition plans and systems in definition and coding of data content, in quality and availability of data, and in the data products resulting.

For government agencies, prevailing mission assignments do not motivate much attention to secondary users and in private enterprise competition slows coordination. A better recognition of the secondary needs peripheral to each agency mission would help if coupled with provisions for private enterprise input to government planning and system guidance.

The shipping industry is moving from laborious pen and pencil reporting into the era of computers and global coordination. In the end, the technology of automated data processing will pervade all parts of the information system and bypass many of the present-day problems. Well planned systems should be able to satisfy most present primary and secondary data needs, and perhaps at less cost. Stronger motivation, and better coordinated plans and coverage among competitors should help to speed the potential benefits.

CHAPTER 8

FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS

Throughout the period covered by this study it has been brought to the attention of the Maritime Information Committee that rapid progress is being made in the automation of the handling of maritime statistical data. This progress has been delineated throughout this report. Thus, it is logical that a general summary of the anticipated role of automation in the future should precede the other findings of the committee.

From the findings of Chapters 2 through 7 the committee has culled lists of opportunities for improvements that are both possible and desirable though not necessarily practical or economical. By synthesizing these lists of improvement areas, the committee reached a set of conclusions relative to findings that are of the greatest importance and that are susceptible to being dealt with in the immediate and near future. The conclusions are then followed by a set of recommendations that constitute the final results of this critical appraisal of commercial maritime information.

The Role of Automation

The present set of systems for collecting, processing manipulating, disseminating, and interpreting maritime data and statistics has evolved in parallel with the development of marine shipping systems over the past two centuries. However, significant new technological developments have begun to intrude on the maritime cargo industry. This intrusion is manifest in the form of several of the opportunities and problems discussed below.

Looking ahead over a time span of one or two generations, the committee can envision how maritime data and statistics will be handled in the 21st century. Specifically, it is envisioned that written (paper or hard copy) documents will largely, if not entirely, disappear, and all documents that are the true source of data and statistics (e.g. manifests, bills of lading, customs clearances, ship sailings, etc.) will be fed electronically to, and handled by, computers. The statistics will be transmitted between computers and between computers and users by commercial telephone or data transmission lines, or by satellites, where speed and accessibility so mandate.

In contrast to an all-electronic, no-paper situation of the 21st century, the current system of maritime-related data acquisition and transmission continues to be influenced by the post-Civil War era, and perhaps even by the earlier post-Revolutionary War development of documents for maritime trade.

We have already witnessed the development of computer-to-computer data transmission between some maritime private industries and some of the governmental agencies. In fact, several agencies no longer publish all of their accumulated data in hard copy format; instead they make some data available only through magnetic tapes. Until the all-electronic processes of data handling, from acquisition through dissemination, are cost-effective for all maritime industry suppliers and users, the changes in the data collection may have to be paralleled with manual data handling. Any realistic long-term solution must focus on the mechanism by which the data will be acquired and transmitted as well as the actual quality and content of those data and their related cost.

In the course of meeting with several hundred members of industry, it has become apparent that various problems will be eradicated or modified by the time the all-electronic system of data origin, transmission, and control is implemented. It becomes necessary, therefore, to consider the means by which a short-term solution (that is, one which will still deal with hard copy documentation instead of electronic documentation) will mesh with the long-term solution (the all-electronic system). Such short-term solutions will be of no great service to the industry unless they result in a more easily implemented long-term solution as well.

Findings Relative to Potential Improvements

During the course of this study, a number of opportunities, problems, and suggested improvements were revealed with respect to maritime statistical data and related information systems. Some of these probably are real opportunties for improvement, some may be lacking in public service value, and others may be too costly to implement. Inasmuch as neither benefits nor costs have been assessed nor have evaluations been made, several of these findings require further study before an assessment can be made of their potential for data base and systems improvement.

The potential improvements are listed under the chapter heading in which they are mentioned. The subjects covered by this condensed list are amplified in the main body of the text. Several improvements have suggested themselves as desired improvements in more than one category of maritime statistical data; where such redundancies occurred, the improvement listing has been purposely repeated. These findings are ordered to denote the priority with which industry and government representatives felt the improvements should be undertaken.

Findings Relative to Cargo Characteristics and Movements: Potential improvements in this area include:

- Identifying the full itinerary of and contents of all shipments, especially the true origin and ultimate destination.
- Identifying all waterborne trade by mode of movement, especially containerized cargo.
- Labeling, identifying, and recording the movements of all hazardous cargoes for both safety and statistical purposes.
- Acquiring improved storage, inventory and damage-status data on containers.
- Accelerating the reporting of shipment characteristics and movements to a real-time basis of data acquisition.
- Identifying all carrying vehicles and containers used in the movement including ships, barges, trucks, trains, aircraft, or pipelines.
- Acquiring information on shipments not now included in the public record, e.g.: local and feeder movements by all modes, and contents of freight-of-all-kinds (FAK) containers.

Findings Relative to Vessel Characteristics and Movements: Potential improvements in this area relate specifically to the waterborne commerce of the United States and include:

- Reporting the port of origin and the port of destination of all vessel movements as input to information on the true origin and ultimate destination of all cargo shipments.
- Providing information on deadweight and displacement for each ship and barge movement.
- Developing identification systems for oceangoing and inland waterways ships and barges to permit unique designation of each cargo-carrying vessel as well as of the operator or owner.
- Categorizing each ship and barge by type and standardizing their type definitions.
- Standardizing the definitions of cargo handling gear and equipment.
- Devising a standardized method of specifying the container carrying capacity of ships and barges.
- Standardizing the specification of speed and fuel consumption characteristics of powered vessels.
- Improving the reporting of barge characteristics.
- Reporting of ship and barge movements on a near-time or real-time basis in both foreign and domestic trades on oceans, inland waterways, and the Great Lakes.
- Upgrading current vessel movement data to improve both accuracy and timeliness.
- Tracking of vessels within ports, harbors, and inland waterways as well as coastwise between seaports including movements in intra-port and offshore domestic trade on a real-time basis.

Findings Relative to Ports and Waterways: Potential improvements in this area include:

- Improving and expanding upon the data and statistics relative to commodity flows through ports, including the first ports of vessel loading and discharging of cargoes that comprise the waterborne commerce of the United States.
- Amplifying data availability on inland modes of transportation of overseas and domestic waterborne cargo shipments by commodity.
- Accelerating reporting systems to secure real-time data on movements within ports, harbors, and inland waterways.
- Acquiring data on ship and barge casualities occurring in inland waterways, ports, and harbors and relevant causal data on waterways characteristics and operational deficiencies leading to improved traffic control in dangerous areas.
- Identifying hazardous and contaminating cargoes prior to handling or movement within ports and waterways.

Findings Relative to Information Systems Management: Potential improvements in this area include:

- Improving data acquisition methods to match prevailing cargo movement dynamics and to utilize the capabilities of modern data handling technology to the point where real-time processing is feasible for those data that require such treatment.
- Improving the coherence, uniformity, compatibility, standarization, and scheduling of data acquired.
- Providing better guidance, including referral services and centralization of information sources better to serve secondary users of data.
- Improving the definition and coding used for true origins, ultimate destinations, and intermodal transfer locations.
- Improving the definition and coding used for commodity description, especially hazardous cargo.
- Improving the definition and coding of cargo carriers; ships, barges, towboats, trucks, trains, aircraft, and pipelines.
- Improving the definition and coding of packaging, containers,and trailers.
- Seeking the earlier release of proprietary and confidential information, or immediately releasing information in a more aggregated form, especially for statistical purposes.
- Improving the accuracy of data through more complete definition of movement aspects and minimal use of imputed values.
- Improving timeliness of data dissemination in the form and content required, even for those data where real-time utilitzation is not an established requirement.
- Simplifying and coordinating the collection of raw data and improving interagency coordination.

General Conclusions

The study revealed a number of opportunities to improve the public service in providing maritime information. Some of the apparent improvements would benefit the primary users but many more would expand the usefulness of the data bases to secondary users. The foregoing findings of the study enumerate many of these potential opportunities to improve the system with more particulars to be found in the text of the previous chapters.

As discussed earlier, th findings of potential improvements have been extracted from meetings th the industry and also devolve from the experience of the Maritime Information Committee members. Various of these improvements, although desirable, may not be highly essential or the beneficiary constituencies may be too small to justify alterations to current systems. Thus, several broader conclusions have been reached by the committee which are listed below and should assist in planning and implementing selected system improvements.

- Present systems are sponsored mainly by government agencies and a few private or quasi-governmental institutions. In the main, these sponsors state that their needs are met by the prevailing systems. However, system improvements are attractive to them because they might increase efficiency or offer domains for mission expansion. In contrast, some of the best opportunities for new services are responsive to the needs of secondary users who presently do not share the costs, except for a nominal contribution toward reproduction and distribution costs, of processed data. However, it should be recognized that some of the largest potential secondary users are those who also operate primary systems.
- Interest in improvement appears strongest among federal, state, and local governments, cargo carriers, and to a lesser extent planning and research organizations and port authorities.
- The key problem areas are in the acquisition and pre-processing (including verification) of maritime data. In contrast, there appear to be several private data processing firms able and willing to process data products and handle dissemination.
- Good data systems management stresses that if any consolidation or coordination efforts are undertaken, they should, from the outset, recognize the levels of detail and timeliness required to satisfy the needs to be fulfilled. The scope of the statistical sample, including perhaps 100 percent population coverage if necessary, should match the needs. The schedule or frequency of operational or statistical analyses should be determined well in advance.
- Significant needs for the acquisition of additional data have been identified. The potential benefits accruing from satisfying each need should be weighed against the projected cost of the data acquisition, processing, and dissemination.

- Many real-time and other operational data are acquired but not used for statistical purposes. Largely this has been a matter of economy but the advent of automation offers opportunities to reuse these data for secondary purposes.
- Several examples of duplication of effort, jurisdictional conflicts, and unnecessary incompatibilities among data systems indicate that there may be opportunities for economies in data acquisition through institutional improvements.
- Many available data are underutilized because potential secondary users are unaware of their existence. There is a need for some form of comprehensive referral service so that users can locate available information.
- In this dynamic era of data handling, specific improvements may prove temporal whereas institutional procedures to provide for continued improvements would be more enduring.
- When considering any developments in, or modifications to data systems, it is clear that whatever is done should adapt the better features of present systems and include a full and accurate description of the nature of the information being handled. There must be mutually consistent definitions that do not overlap other data categories, coupled with easily implementable coding that embraces a strong effort at unifying and standardizing the scope and definition of each part of the information. The record of such definitions should be held in detailed supporting archives.
- Probably the greatest barrier to information system improvements will be the problems of measuring and allocating benefits on one hand and, on the other hand, that of estimating and allocating related costs between primary and secondary users and between government and private sponsors. Further barriers to improvement include legal, (government) mission responsibilities, confidentiality, jurisdictional assignments, traditional entrenchments, institutional impediments, corporate pride and secrecy, and human inertia.

This study has revealed that government agencies are the major primary users and that the major secondary users of maritime statistical data are other government agencies, the carriers, port authorities, and planning and research organizations. Their main interests are in the true origin and ultimate destination of commodity movements, in the characteristics of the cargoes, and in the type of containers and vessels in which the goods are carried. Total information on where a given maritime shipment originated, what commodities it included, how it was packaged, in what vehicles it traveled, where it was transshipped, and its destination, are not reported by any government organization nor can this be pieced together from the various federal disseminators. These data are not reported either (1) because the data have not been acquired in the first place, (2) because the originators have insisted they be given confidential aggregated treatment, or (3) because there is not an adequate identification and coding system employed by federal data collectors

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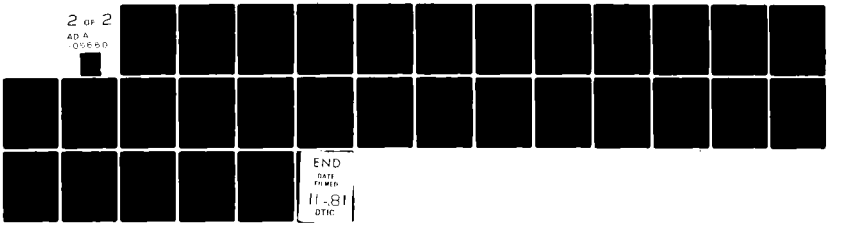

for locations or for commodities and the containers or transport units in which they are carried.

It is interesting to note that the data input for the statistical information desired by the most prominent secondary users can best be supplied by the carriers and port authorities themselves since the carriers are aware of the origin and destination of cargo shipped by them and the marine vessels in which it travels; each port has knowledge of land transport at its end of a shipment and also the scheduling and locations of intra-port movements and transfers. However, commercial realities and anti-trust concerns dissuade the exchange of information by carriers and by ports.

Among the advantages accruing to the Federal government in collecting, processing, and disseminating such data would be the fact that it could thereby derive information on hazardous cargo arrivals and movements, the location of potentially contaminating cargoes, traffic movements within ports and waterways, and the adequacy of port feeder services.

It is of interest and importance to note that many of the findings and conclusions of the Maritime Information Committee are highly consistent with, and supportive of, the findings and conclusions of the Transportation Data Requirements Project (17) of the Transportation Research Board of the National Research Council which was sponsored by the U.S. Department of Transportation. It is worth identifying these points of common perspective. This report and the report cited above seem to agree that:

- Better organization of programs is more important than more resources.
- Better coordination of federal producers through some kind of committee structure is needed.
- Better systems to disseminate information on what is available are required.
- Better mechanisms are in order for users to make their needs known.

Recommendations

Although the recommendations on maritime data and statistics that could result from the committee's work and this report are numerous, only those with the greatest potential for acceptance are cited herein. The recommendations made are intended to meet several objectives. These objectives include the following:

- Satisfy the most pervasive and urgent needs of the maritime industry for data and statistical information
- Facilitate and promote the commerce of the United States
- Improve public safety
- Enhance the national defense

These objectives can be met by expanding maritime information data bases to include better cargo flow and hazardous cargo information; by improving industry communication and interaction with government on the subject of maritime data and statistics; and by accelerating the proper use of automation in information handling. The Maritime Information Committee has attempted to reconcile its recommendations with the anticipated ultimate reality of automated data management and the prevailing explosion of innovative technology and useful application. Many of our present-day maritime information problems will be engulfed in the technological explosion and, if properly reacted to, will largely evaporate in its aftermath. These recommendations are aimed at guiding new developments so as to achieve national goals as effectively and efficiently as possible.

The committee has formulated a series of recommendations which could lead to substantial improvements in maritime information systems. The recommendations bear on the following subjects:

- Development of more complete and definitive cargo shipment information with particular emphasis on origin and destination information and containerized cargo information
- Development of a more formal and regular liaison between the secondary and primary users of maritime information
- Improvements in identification of hazardous cargo
- Centralized coordination of maritime data bases
- Continued action to promote automation of information systems

Each of these recommendations is discussed below.

Development of More Complete and Definitive Cargo Shipment Information: The committee's work revealed that present maritime cargo shipment data bases and statistics have not evolved to reflect the changing maritime industry. Over the last decade, many changes have taken place in the waterborne transport of goods. Containerization has become the predominant mode of packaging in the general cargo and liner market segments. In the past few years, geographic market definition and scope have changed for water carriers and the U.S. ports. With the advent of the mini-bridge and micro-bridge intermodal services, ports and carriers can attract cargo directly from the entire United States. With these changing shipping patterns, better descriptions of the market place are needed to adequately plan and manage equipment fleets, and sales and marketing efforts.

All segments of the industry--shippers, seagoing and inland-waterway vessel operators, railroads, trucks, ports, and shipyards--consistently and continually have expressed the need for more complete cargo shipment information. The primary information required is true origin/ultimate destination of all cargo movements and the packaging -- mainly, whether the shipment is containerized or not. The findings of this study, including Chapters 4 through 7, enumerate and amplify many opportunities to enhance cargo shipment information.

Recommendation No. 1:

The committee recommends that the primary collectors and disseminators of maritime data and statistics undertake an expansion of their data bases to include other needed information with initial emphasis on origin, destination, itinerary, and packaging information for all shipments.

The committee recognizes that this recommendation can be acted upon only by a selected group. Namely, the Bureau of the Census, the U.S. Customs Service, and the Corps of Engineers. The committee further recognizes that Census, Customs, and the Corps are aware of these needs and have the expansion of these data bases under consideration.

Mutual-aid arrangements may become easier as participants realize mutual benefits. The Corps of Engineers has recently gained some first-hand knowledge of who "benefits" and who "pays". Working with several ocean carriers on a variety of projects, both the Corps and the ocean carrier industry have discovered that increases in operating efficiency or enhanced availability of information, benefits not only the recipient but also the provider of the information.

For example, quite a few carriers voluntarily and at their own expense supply Customs and the Department of Agriculture with advance manifest information. While the federal government is the nominal beneficiary, the carriers have reaped substantial and unanticipated benefits. One of these is a reduction in the number of times they must "spot" or reposition a container solely to meet federal inspection requirements. Since the average cost of a container spot movement is about $50.00, a significant dollar saving has resulted.

The committee strongly urges these agencies to undertake such data base developments.

The availability of origin/itinerary/destination and packaging/containerization information will allow more efficient and effective use of the nation's maritime resources. Operations of the ports and of carriers can be better planned and carried out. More complete movement information is a common need of all segments of the shipping industry and indeed it is a common need of all segments of the entire transportation industry. For example, Conclusion 3 of the report of the Transportation Data Requirements Project (17) states in part ". . . The typical respondent has major concerns for several types of transportation and for all types of data, but the most pervasive needs are for data that describe the origins and destinations of passengers and freight, commodity flows, ..." Since the need is shared among other modes of transportation it would appear that the maritime industry can anticipate the support and active cooperation of other members of the transportation industry in carrying out this recommendation.

Development of a More Formal and Regular Liaison Between the Primary and Secondary Users: Today's management of maritime information systems appears to ignore, to a large degree, the needs of

secondary users; opportunities to improve or increase services frequently go unheeded. The Maritime Information Committee study found a strong but narrow focus in the agencies on specific missions, with little attention to broader national needs such as facilitation of commerce or enhancement of national defense.

Some of the slowness of response to the needs of secondary users and to adopt measures to increase the efficiency of existing systems is attributable to the lack of adequate communication with secondary users and guidance as to their needs. Advisory and user committees do exist and function as a liaison between the industry and the primary collectors and users. However, these committees are usually informal, unstructured, and do not receive the support required to do an effective job.

Recommendation No. 2:

The committee recommends that government and private advisory and coordinating committees dealing with maritime information systems be formalized and restructured so as to provide better communication, central coordination, and better reflection of a more authoritative recognition of user group needs.

Committees such as the Transportation Data Coordinating Committee are expected to monitor the quality of data service being provided, recommend increases, decreases, or modifications to the service and to evaluate opportunities for new services. Suggested opportunties for improvement could feature benefits to secondary users. This study has indicated a need to strengthen the representation of secondary users in the work of such committees to provide for information system development and operation. Private sector groups are especially anxious to participate in interagency planning.

Improvement in Identification of Hazardous Cargo: This study revealed repeatedly that the prevailing information systems lack information on hazardous cargoes of all types. The problem appears to involve a great deal more than information alone. International controls are not consistent, standardization of markings is incomplete, documentation is lacking, inspection coverage is minimal, and policing is infeasible because the basic controls are inadequate.

This problem is important enough to deserve a separate recommendation. It applies to all forms of hazardous cargoes including dangerous cargoes such as munitions and explosive or combustible chemicals. It includes lethal and noxious chemicals, contaminated agricultural products, and sewage, petroleum, nuclear, or other potential pollutants. The most acute need is for real-time data to minimize and control hazards as a matter of public safety. But, there is also the need for statistical data for use in public planning and for post-analysis of the distribution patterns of such materials.

Recommendation No. 3:

The committee recommends that hazardous cargo marking and documentation be improved and that related data acquisition be expanded so as to provide a complete, dynamic picture of prevailing flow and storage patterns for hazardous cargoes on a real-time basis.

The committee recognizes that substantial public exposure to hazards does exist and is at present ill-defined. This problem is acute, urgent, and real for almost all hazardous material transported as general cargo, and is especially so with respect to containerized cargoes. It involves international agreements, marking standards, inspection, warnings, alerts, policing, and penalties. It involves the interfaces with ports, waterways, land carriers, shippers, and consignees. It requires real-time information flow and planning and budgeting for enforcement activities far beyond the responsibility of this committee.

The real intensity of this problem was recognized but was not studied because the scope of the problem was largely outside the committee charter. For this reason, the committee recommendation deals with only a small segment of the problem. We trust that the U.S. Customs Service, Department of Defense, Department of Energy, Department of Transportation, Environmental Protection Agency, and other responsible agencies are tackling the broader aspects of this important problem.

Improved Coordination of Maritime Data Bases: A more complete set of maritime data bases with uniform and compatible definitions and coding would offer many opportunities to improve data service to both primary and secondary users. This goal could be attained through the establishment of a formal coordinating committee of all federal agencies involved in the collection, processing, dissemination, and use of maritime transportation data. This Federal Maritime Data Coordinating Committee should consist of representatives of at least the Bureau of the Census, U.S. Customs Service, Maritime Administration, Federal Maritime Commission, Coast Guard, and the Army Corps of Engineers. A single existing agency should be assigned permanent chairmanship of the committee with the responsibility of calling regular meetings, setting agenda, recording minutes, and ensuring that the deliberations and conclusions of the committee are implemented to the extent possible.

The Federal Maritime Data Coordinating Committee would discuss and coordinate the activities and plans of the several agencies as they relate to maritime data and statistics. The committee should continually assess the needs of public and private sectors alike to assist them in establishing priorities and mechanisms for data acquisition, identification, and coding. Data acquisition and data base management functions could benefit from a coordinated approach to data definition and coding.

Recommendation No. 4:

The committee recommends that the U.S. Government form a Federal Maritime Data Coordinating Committee to meet, discuss, and coordinate the maritime data and statistics activities and plans of involved federal agencies. The government should assign one agency permanent chairmanship of this Committee; that agency to be responsible for ensuring coordinated federal action on matters relating to maritime data and statistics that will best serve the interests of both the public and private sectors in the most cost effective manner.

The recommended centralized coordination of maritime transportation data bases would assist in resolving many of the prevailing impediments to progress:

- There would be better coordination of all areas of maritime data and statistics.
- Definition and coding inconsistencies such as those for commodities would be more easily resolved or bypassed.
- Jurisdictional problems could be eased.
- All data users, primary and secondary, private and public, would have a voice in the data acquisition, processing, and dissemination processes.
- There would be a single reference source for all maritime data.

The selection of an organization to chair this Federal Maritime Data Coordinating Committee should be made with full recognition of the information needs of shippers and shoreside cargo carriers and with the provision that the needs and interests of the private sector are adequately voiced and considered.

Continued Action to Promote Automation of Information Systems: Important benefits are available through automation of information systems. These benefits include more complete, accurate and timely information, and greatly increased efficiencies of operation for the suppliers, processors, and users of information. Incentives should be considered for both private organizations and government agencies to move rapidly toward fully computerized data collection and transmission systems. This should enable the transmission to come directly from the document control computer employed by ocean carriers for example, so that the same information used to bill the shipper is, with only minor automated modification, transmitted to the appropriate agency. Such incentives need not be monetary. One ocean carrier has already cooperated with Customs in using document control computers because it was cost effective. The improvement in quality of service brought new business.

Recommendation No. 5:

The committee recommends that planned maritime data system improvements and their implementation be designed so as to be compatible with, and promote, the use of automated data handling techniques; even to the point of establishing various incentives to accelerate both improvements and the development of automation.

There are additional non-monetary incentives that also can be advanced by government to hasten the transformation from manual to automatic data handling. These include standardization of commodity and location coding systems for positive and definitive identification. For example, the codified location of a vessel and its shipment origin or destination could be given to within one mile on the earth's surface. Additional incentives are to offer the suppliers of real-time input data a real-time computerized output of vessel movements that can be used in operational control and efficient use of port facilities. Eventually such services might be utilized to coordinate the movements of ships and barges with those of inland feeder services.

From the governmental standpoint, and that of the public which government serves, the rapid transformation to fully automated data acquisition, processing, and dissemination will not only be cost effective due to the elimination of myriad paper transactions, but also will permit more rigid control over the movement and handling of hazardous and contaminating cargoes. This latter prospect alone is adequate justification for moving ahead as rapidly as possible in the application of automation in dealing with maritime statistical data.

The above recommendations are made in view of their apparent value to the maritime industry and the previously stated objectives. The responsible organizations should consider the maritime information system improvements recommended and revealed by this study and act vigorously to implement those improvements.

REFERENCES

[1] Cunningham, R. T. and Phillips Stitt, "Tonnage Measurement," Chapter V of "Ship Design and Construction," edited by Robert Taggart, Society of Naval Architects and Marine Engineers, New York, 1980.

[2] "Maritime Information Sources: A Guide to Current Statistical Data," National Academy of Sciences-National Research Council, Maritime Information Committee, December 1978.

[3] "Maritime Information Sources: A Guide to Current Data," National Academy of Sciences-National Research Council, Maritime Research Information Service, August, 1979.

[4] U. S. Department of Commerce, Bureau of Census, "Foreign Trade Statistics," Regulations, page 3, August 1976.

[5] United National Statistical Papers, "Series M, No. 34/Rev. 2"

[6] U. S. Department of Commerce, Bureau of Census, "Guide to Foreign Trade Statistics, 1979," January, 1980.

[7] Letter from Francis M. Sharp, Chief Navigation Analyses Center, Institute for Water Resources, Corps of Engineers, July 28, 1981.

[8] Performance Monitoring System, Sample Reports Manual, Study prepared for Department of the Army, Corps of Engineers, Washington D. C., by Dynamics Research Corp., Wilmington, MA.

[9] Fleet Data Service, Houston, TX, "1979 FDS Guide to American Inland Towboat Fleets," annually; "1979 Guide to American Offshore Fleets, Offshore Service Vessels;" "1979 Guide to American Offshore Rug Fleets."

[10] The Waterways Journal Inc., St. Louis, MO, "The Inland River Guide," annually; "Inland River Record, 1975," annually.

[11] "Waterborne Commerce of the United States," Department of the Army, Corps of Engineers, annually.

[12] "Port Development in the United States", Maritime Transportation Research Board, National Research Council, National Academy of Sciences, Washington, D.C., 1976.

[13] U. S. Department of Commerce, Maritime Administration, "Conferences on U. S. Port Industry Data Requirements: Final Report," no date (1977), p.4.

[14] U. S. Department of Commerce, Maritime Administration, "U.S. Port Data and Computer Applications: Conference Report," no date (1978), p.4.

[15] Foreign Trade Data Users Working Group, "Minutes of Meeting, May 28, 1980," at the Air Transport Association Headquarters, Washington, D.C. 1980.

[16] Ship Structure Committee Report "A Limited Survey of Ship Structural Damage" by Seth Hawkins, George H. Levine, and Robert Taggart, Robert Taggart Incorporated, SSC-220, U. S. Coast Guard Headquarters, Washington, D. C. 1971.

[17] "Identification of Transportation Data Needs and Measures for Facilities of Data Flows" Transportation Research Board. NAS/NRC Report of March 1981.

APPENDIX A

PARTICIPANTS
WASHINGTON D.C. REGIONAL MEETING

ADEQUACY OF MARITIME DATA AND STATISTICS
Maritime Information Committee

Lecture Room
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SEPTEMBER 18, 1979

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APPENDIX B

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NEW ORLEANS REGIONAL MEETING

ADEQUACY OF MARITIME DATA AND STATISTICS
Maritime Information Committee

Le Pavillion Hotel
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ADEQUACY OF MARITIME DATA AND STATISTICS
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Holiday Inn - Civic Center
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APPENDIX D

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Maritime Information Committee

Sheraton St. Louis Hotel
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APPENDIX F

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Various government agencies, and a few private organizations collect and process maritime data to fulfill a mandate prescribed by law or for their own purposes. In the process of carrying out these mandated data acquisition activities, the collectors call upon the maritime industry to fill out differing forms, with differing information demands, covering different time periods and different portions of the data universe. The resulting statistics are published in separate reports and made available on different time schedules. This has created some confusion and incompatibility in the information made available to

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20 ABSTRACT (Continued)

users of maritime statistical data.

This study has revealed that government agencies are the major primary users and that the major secondary users of maritime statistical data are other government agencies, the carriers, port authorities, and planning and research organizations. Their main interests are in the true origin and ultimate destination of commodity movements, in the characteristics of the cargoes, and in the type of containers and vessels in which the goods are carried. Total information on where a given maritime shipment originated, what commodities it included, how it was packaged, in what vehicles it traveled, where it was transshipped, and its destination, are not reported by any government organization nor can this be pieced together from the various federal disseminators. These data are not reported either (1) because the data have not been acquired in the first place, (2) because the originators have insisted they be given confidential aggregated treatment, or (3) because there is not an adequate identification and coding system employed by federal data collectors for locations or for commodities and the containers or transport units in which they are carried.

The recommendations made in this report are intended to satisfy the most pervasive and urgent needs of the maritime industry for data and statistical information, facilitate and promote the commerce of the United States, improve public safety, and enchance the national defense.